98-031

Carus Chemical

SR/

GEOSYNTEC CONSULTANTS

621 N.W. 53rd Street • Suite 650
Boca Raton, Florida 33487 • USA
Tel. (561) 995-0900 • Fax (561) 995-0925

5 January 1998

Mr. Timothy J. Murphy
Project Manager, Remedial Project Management Section
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62794-9276

Subject: Transmittal of the "*Site Investigation Report, Northern Undeveloped Area, Carus Chemical Company Manufacturing Facility, LaSalle, Illinois*"

Dear Mr. Murphy:

On behalf of the Carus Chemical Company, GeoSyntec Consultants (GeoSyntec) is pleased to submit three copies of the above-referenced report for review by the Illinois Environmental Protection Agency (IEPA).

Please call Ms. Weeks if you have any questions or need additional clarification.

Sincerely,

Nandra D. Weeks, P.E.
Senior Project Manager

Thomas A. Peel, Ph.D.
Florida Branch Manager

Enclosure

Copies to: Roger C. Threde
Carus Chemical Company
1500 Eighth Street
LaSalle, Illinois 61301

Mark R. Sargis
Mauck Bellande & Cheely
19 South LaSalle Street, Suite 1203
Chicago, Illinois 60603

FR0042/F970180C

Prepared for

Carus Chemical Company
1500 Eighth Street
La Salle, Illinois 61301

SITE INVESTIGATION REPORT
NORTHERN UNDEVELOPED AREA

CARUS CHEMICAL COMPANY
MANUFACTURING FACILITY
LA SALLE, ILLINOIS

Prepared by

GEOSYNTEC CONSULTANTS
621 N.W. 53rd Street, Suite 650
Boca Raton, Florida 33487

Project No. FR0042

December 1997

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

TABLE OF CONTENTS (Continued)

LIST OF TABLES (Continued)

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF APPENDICES

1. INTRODUCTION

1.1 Terms of Reference

This document titled *"Site Investigation Report, Northern Undeveloped Area"* (hereinafter referred to as the Phase III Investigation Report) has been prepared by GeoSyntec Consultants (GeoSyntec) for Carus Chemical Company Manufacturing Facility (Carus Chemical Company), a division of Carus Corporation. This report has been prepared in accordance with the Sampling and Analysis Plan dated 6 November 1996 approved by the Illinois Environmental Protection Agency (IEPA). This document summarizes the results of the Phase III Investigation and is being submitted as part of the Illinois Site Remediation Program administered by the IEPA, Remedial Project Management Section, Bureau of Land, and promulgated by 35 Illinois Administrative Code (IAC) Part 740. The purpose of this investigation is to evaluate suspected contamination in the Phase III - Northern Undeveloped Area. This Phase III Investigation Report includes a description of the site, a site history, a summary of the fieldwork performed, an evaluation of the data collected, and GeoSyntec's conclusions and recommendations for the site. As such, this report meets the Site Remediation Program requirements that the report identify recognized environmental conditions existing at the site, related contaminants of concern, and other associated factors. As stated in the Site Remediation Program guidance document, such information will be used to aid in the identification of risk to human health, safety and the environment; the determination of remediation objectives; and the design and implementation of a Remedial Action Plan. This report was prepared by Ms. Nandra D. Weeks, P.E., and Ms. Mayra Castellanos, and was reviewed by Mr. R. Neil Davies, P.E., all of GeoSyntec.

1.2 Site Location

The Phase III - Northern Undeveloped Area (hereinafter referred to as the Phase III Area) is located approximately 3,500 ft (1,070 m) north of the Carus Chemical Company Manufacturing Facility. This area is partly owned by Carus Chemical Company and is located directly north of the Apollo Warehouse, formerly referred to as the Apollo Metal Works (Figure 1). The Phase III Area is located in the southeast quarter of the La Salle 15 minute Quadrangle Map within Township 33 North and Range 1 East [USGS, 1966]. The majority of the Phase III Area is located within the southeast corner of the northwest quarter of Section 10. A small portion of the site (southeast portion) is located within the southwest corner of the northwest quarter of Section 11. The site is bounded on the north and west by a sparsely populated residential area, on the northeast by an active rock quarry, on the east by the Little Vermilion River, and on the south by the Apollo Warehouse.

The Phase III Area consists of: (i) a depressed basin or lowland area (approximately 15 acres (6 hectares)) which has been historically referred to as "The Muddies"; (ii) the surrounding upland area which consists of the Illinois Central and Gulf Railroad (ICG) embankment to the east of the lowland area and former Sweney Gasoline and Oil Company to the west of the lowland area; and (iii) the upland area between the ICG Railroad embankment and the Little Vermilion River north of the Apollo Warehouse (Figure 2).

GeoSyntec previously performed investigations of the Phase I and Phase II Areas (Figure 3). The Phase I Area primarily includes the main manufacturing facility property or "upland" area [GeoSyntec, 1994]. The Phase II Area primarily includes the property east of the Phase I Area and west of the Little Vermilion River [GeoSyntec, 1996]. Results of the investigations were submitted to the IEPA under separate cover as the "*Phase I Site Investigation Completion Report*" [GeoSyntec, 1994] and "*Phase II Site Investigation Completion Report*" [GeoSyntec, 1996].

1.3 Report Organization

The remainder of this report is organized as presented below.

Section 2 - *Site History*, provides a brief history of the area of investigation, a summary of the historical records search performed, and information obtained from an interview with Mr. Paul Carus II, Executive Vice President of Carus Chemical Company.

Section 3 - *Field Investigation*, provides the site-specific objectives and describes the fieldwork methodology.

Section 4 - *Site Assessment and Sampling Results,* presents the field investigations and analytical laboratory results. In this section, analytical results are compared to the IEPA Tier 1 cleanup objectives or screening criteria for properties classified as "industrial/commercial".

Section 5 - *Data Assessment*, evaluates the constituents of concern identified in Section 4 and provides the supporting documentation for the conclusions and recommendations presented in Section 6.

Section 6 - *Conclusions and Recommendations*, summarizes the field activities and analytical results. This section provides recommendations for future actions at the Phase III Area.

2. SITE HISTORY

2.1 Overview

The lowland portion (i.e., depression basin) of the Phase III Area was originally part of the Little Vermilion River valley. The river valley was a horseshoe-shaped, deeply incised meander bend. The walls of the valley were steep, with elevations typically in the range of 600 to 610 ft (183 to 186 m) above mean sea level (MSL) (Figure 1). In approximately 1850, the ICG Railroad built a railroad bridge (trestle) which generally ran north-south through the area. The trestle crossed the river in two places, over each bend of the horseshoe. Around 1900, after repeated washouts of the trestle, the railroad company cut a new channel for the river across the neck of the meander and built an embankment across the old river channel where the trestle had been. The embankment created an enclosed depression in what was once the old river channel. This depression collected water and became locally known as "The Muddies".

2.2 Investigation Area Setting

The area of investigation encompasses the lowland area, the former above-ground storage tank area at Sweney Gasoline and Oil Company, the surface-water drainage pathways leading from the surrounding uplands to the lowland area, and sections of the Little Vermilion River bank, as further described below.

Lowland Area

The lowland area is a heavily wooded, depressed basin, that was part of the Little Vermilion River before its course was altered to construct the now abandoned ICG Railroad. The present ground surface of the lowland area is approximately 20 ft (6 m) lower in elevation than the surrounding ground surface. The area contains fill material placed from various sources. It is believed that these sources include spent plating solutions and wastewater from the Apollo Metal Works, ore processing sludge and wastewater from Carus Chemical Company operations, unauthorized disposal of yard waste and white goods, and likely disposal of industrial waste products from Matthiessen & Hegeler Zinc Company (M&H) located just south of the lowland area. The waste fill, the natural material beneath the fill, and the ground water were the media investigated in the lowland area.

Former Sweney Gasoline and Oil Company

The former Sweney Gasoline and Oil Company, located on the bluff above and west of the lowland area, is presently sparsely wooded with no visible remains of previously existing buildings or structures (Figure 4). Surface and subsurface soils were investigated in the area where above-ground storage tanks once existed.

Surface-Water Drainage Pathways

Surface-water drainage pathways leading from the upland area to the lowland area were included as part of this investigation. These drainage pathways have developed as preferential surface-water flow pathways. Erosion gullies of various sizes extend from the upland area down the sideslopes and into the lowland area. The purpose in evaluating the "sediments" or surface soils where these pathways terminate was to assess possible impacts from upland sources, such as unauthorized dumping.

Little Vermilion River Bank

Also included in the investigation were sections of the Little Vermilion River bank, both upgradient and downgradient of the overflow discharge pipe (Figure 2). The overflow discharge pipe is a component of the surface-water control system installed by Carus Chemical Company. The river sediments were investigated to evaluate the potential impacts to the river sediments upgradient and downgradient of the overflow discharge pipe. The surface-water control system is designed to collect spring water or surface water which accumulates in the lowland area during periods of heavy precipitation. Typically, the system pumps the collected water to the holding pond in the Phase II Area for discharge into the Little Vermilion River through a National Pollutant Discharge Elimination System (NPDES) permitted discharge point. If the system capacity is overloaded, the excess water is discharged from the lowland area (referred to as lagoon 002 in NPDES Permit No. 0002623) directly into the Little Vermilion River via the overflow pipe. Surface-water quality in the holding pond is routinely monitored under the NPDES permit.

2.3 Nature of Operations

Mr. Paul Carus II, Executive Vice President of Carus Chemical Company, was interviewed in person by Ms. Nandra Weeks, P.E., on 29 November 1996 and by telephone by Mr. Jack Raymer, P.G., of GeoSyntec, on 10 February 1997. Mr. Carus has extensive personal knowledge of the industrial history of the Phase III Area and the general nature of site operations. The remainder of this section summarizes the information obtained from Mr. Paul Carus II, unless otherwise referenced.

According to Mr. Paul Carus, the building now known as the Apollo Warehouse was built in the 1920's for the Apollo Metal Works, which was not affiliated in any way with Carus Chemical Company. The Apollo Metal Works was started by Mr. Harry Schusler who was in the business of batch plating 4 by 8 ft (1.2 by 2.4 m) sheets of zinc and other metals. After plating, the zinc-plated sheets were sold to fabricators for manufacture of washing machines and other items. Apollo Metal Works performed copper, nickel, and chromium plating.

According to Mr. Paul Carus, the plating process consisted of three steps: (i) a wash coat of copper; (ii) a thick, protective coat of nickel; and (iii) a thin outer coat of chromium. The plating liquors were dilute, consisting mostly of water. The copper was applied using alkaline copper cyanide solution. The nickel was applied using a nickel sulfate solution, and the chromium was applied using a chromic acid solution. Rolling oils were used in the process, as well as acids to clean the oils. When the plating solutions were spent (e.g., oxidized), the solutions would be disposed of. Plating processes typically generate waste materials in the form of alkaline, rare earth, and heavy metals such as iron, nickel, zinc, cadmium, copper, silver, and gold. A portion of the waste materials (e.g., spent solutions and acid wash wastewater) may have been discharged to the city sewer system. The remainder of the waste materials was discharged into the lowland area (mid 1920's to mid 1930's). This lowland area was reportedly used for ice skating, at least through the 1940's [News Tribune, 1974]. According to the article, Apollo Metal Works pumped waste materials into the lowland area during the summer. The article referenced potential exposure of ice skaters to acidic conditions and was one of the reasons given by the IEPA for investigation of this site.

The Apollo Metal Works went on strike in 1936 and was consequently closed. Between 1936 and 1970, there were no known industrial discharges to the lowland area. The building and surrounding property were conveyed to Carus Chemical Company in July, 1941. Open Court, formerly a division of Carus Corporation, used the building to store and ship books from approximately 1967 to the 1980's. Sometime before 1960 and for an unknown period of time, a portion of the building was occupied by the Illinois Valley Container Corporation (Figure 7). Since approximately the mid 1980's, Carus Chemical Company has used the building as a warehouse for bulk storage of pre-processed chemical products and has improved the property by: (i) installing the surface-water control system, as described in Section 2.2 and shown in Figure 2; and (ii) bulldozing an access road to the drainage pipe for maintenance.

Between 1970 and 1975, Carus Chemical Company piped wastewater generated during ore purification (i.e., beneficiation) and hydroquinone production from the nearby Carus Chemical Company to the lowland area. In 1969, the Sanitary Water Board of the State of Illinois issued Permit No. 1969-EB-592 to Carus Chemical Company. This permit approved use of the large depression located north of the Apollo Warehouse (i.e., the lowland area, or "The Muddies") as a disposal site for industrial waste products with effluent discharges to the Little Vermilion River [Carus, 1969]. The ore purification waste consisted mostly of the soft, black mineral known as pyrolusite (MnO_2), gypsum ($CaSO_4$), and an insoluble barium manganese compound. The pyrolusite was the original manganese ore and the barium manganese compound was produced during the refining process from barium oxide (BaO), which was a mineral impurity in the ore. Trace concentrations of mercury and arsenic, which were impurities in the original ore, may have also been present in the wastewater discharged into the lowland area. The wastewater generated during the production of hydroquinone (a reducing agent used primarily in the photographic process) consisted mostly of manganese oxides associated with the manufacturing of hydroquinone ($C_6H_4(OH)_2$).

As referenced in Section 2.4.2, a lease agreement was signed in 1970 by Carus Chemical Company, the La Salle & Bureau County (LS&BC) Railroad, and M&H, which allowed M&H "to dispose of its industrial waste products" at the site. Prior to this time, M&H had been involved with the smelting and rolling of zinc, mining of coal for zinc processing, and the manufacture of sulfuric acid and ammonium sulfate fertilizer. M&H ceased coal mining operations in 1937, smelting zinc in 1961, and manufacturing sulfuric acid in 1968. From 1968 to 1978 (when the company went out of business) operations consisted solely of rolling zinc. Industrial waste products from any of these operations may have been disposed of in the lowland area during the history of M&H. Specifically, the company was rolling zinc at the time the referenced lease was executed.

Although the upper perimeter of the lowland area is approximately 1,100 ft (340 m) by 600 ft (180 m), the actual filled portion where wastewater from the Apollo Metal Works and Carus Chemical Company was discharged encompasses a much smaller area. The filled portion of the lowland area varies in thickness from approximately 11 ft (3 m) to 35 ft (11 m) thick. Presently, there are no known wastewater discharges to the lowland area.

In the past, unauthorized access to the site has occurred. There is evidence of past unauthorized dumping of household items (e.g., trash, white goods, etc.) primarily on the west slopes leading to the lowland area. Currently, fencing exists around most of the Phase III Area to prohibit unauthorized dumping and unauthorized access.

2.4 Historical Records Investigation

A historical records search was performed. Available documents at local libraries, government agencies (e.g., courthouse), and Carus Chemical Company files were reviewed. The remainder of this section summarizes the industrial history of the site based on the results of the records search. These findings are organized according to the sources from which the information was obtained: (i) Sanborne™ maps; and (ii) property title records.

2.4.1 Sanborne™ Maps

Sanborne™ maps dated 1926, 1949, and 1960 were obtained and reviewed for the Phase III Area (Figures 5, 6, and 7, respectively). These maps show the Apollo Warehouse and the Sweney Gasoline and Oil Company; the undeveloped portion of the Phase III Area (i.e., the lowland area) is not included on the Sanborne™ maps. Both the Apollo Metal Works and Sweney Gasoline and Oil Company predate 1926. The 1926 map shows the Apollo Metal Works facility during its active phase. The 1949 and 1960 maps show the Apollo Metal Works building being used as a stock warehouse by Carus Chemical Company. By 1949, an addition to the original building, along with a dust collector, had been constructed. The maps were reviewed in an attempt to locate a discharge pipe that reportedly extended into the lowland area. No evidence of this pipe was found on the maps; however, an approximately 10-ft (3.1-m) length portion of iron pipe was uncovered in the field (see Figure 2). This pipe was likely associated with discharge of spent liquors and acid wash wastewater from the Apollo Metal Works.

The 1926 map shows four above-ground oil and gasoline tanks at the Sweney Gasoline and Oil Company, along with an oil house and another unidentified small structure. On the 1949 Sanborne™ map, five above-ground oil and gasoline tanks were shown; the unidentified structure was no longer shown; however, a larger, unidentified structure was present. There were no changes to the Sanborne™ map between 1949 and 1960, with the exception that a portion of the Apollo Metal Works building was occupied by Illinois Valley Container Corporation.

2.4.2 Chain of Title Investigation

A chain of title search for the Phase III Area properties was researched in the records room of the La Salle County Courthouse by Mr. Ron Haas of Alexander & Hamilton, Inc. (A&H) in April 1997. This search was based on the following: (i) a map of Carus Corporation properties provided by site personnel; and (ii) locating historical articles and documents with references to Carus Chemical Company, Carus Corporation, Apollo Metal Works, ICG Railroad, and/or the Sweney Gasoline and Oil Company. In addition, Chamlin & Associates, Inc. (Chamlin) has over the past several years assisted the property owners with surveying and indexing of properties. GeoSyntec contacted Chamlin regarding properties adjacent to and contained within this Phase III Investigation. The results of the A&H search and Chamlin transactions are presented below:

- A portion east of the lowland area and west of the ICG Railroad was conveyed to Carus Corporation in July 1981. The remainder of the lowland area now owned by Carus Corporation was deeded over by the LS&BC Railroad in December 1981. Prior to this time, the property was owned by LS&BC

Railroad back to the mid 1800's. In February 1970, a lease agreement was signed by Carus Chemical Company, the LS&BC Railroad Company, and M&H to allow the lowland area, or depression, to be "used by Carus as a sludge disposal site for the disposal of its industrial waste products". The lease also allowed for M&H to "dispose of its industrial waste products at the disposal site facilities on the Leased Property, provided that such industrial waste products are in free flowing slurry form".

- The northernmost portion of the lowland area was conveyed to John Pohar and Sons, Inc. by Edwin and Agnes Schott in November 1972. This portion of the lowland area remains in Pohar's possession.

- The former Sweney Oil and Gas Company comprised 0.273 acres northwest of the Apollo Metal Works building. It appears that LS&BC Railroad Company owned the property while the Sweney Oil & Gas Company was in operation. In March 1892, the property was conveyed to the LS&BC Railroad Company by Jabez and Hannah Lee. No other records indicating transfer of ownership were found, until conveyance of the eastern corner of the property to the Carus Corporation in December 1981 by the LS&BC Railroad; the remainder of the property was conveyed by LS&BC Railroad in March 1990. A lease dated 1 July 1979 to the City of La Salle by the LS&BC Railroad was also discovered, reportedly for disposal of construction debris.

- The Apollo Metal Works and a small parcel of property surrounding the building were conveyed by M&H to the Apollo Metal Works sometime before July 1923 (Book 536, p. 571). In July 1923, property east of the Apollo Metal Works property was conveyed by M&H to Apollo Metal Works. Other records indicate that this property was necessary for an addition to the building which was constructed in the mid to late 1920's. In July 1941, the property was conveyed to Carus Chemical Company by Apollo Metal Works.

- Internal Carus Corporation documents indicate that the ICG Railroad right-of-way (owned by ICG Railroad back to the mid 1800's) was conveyed to Carus Corporation via a quit claim deed, but no date is referenced. However, according to the title search performed by A&H, there is no record that the quit claim deed was filed in the La Salle County Courthouse.

3. FIELD INVESTIGATION

3.1 Overview

The Phase III Investigation was performed to obtain data to evaluate the presence of Comprehensive Environmental Response Compensation Liability Act (CERCLA) Program Target Compound List/Target Analyte List (TCL/TAL) constituents in soils and/or ground water within the Phase III Area that may have been impacted by historical site operations. The investigation was also designed to provide information about the site-specific geology, hydrogeology, and geochemical conditions. The information gathered during this investigation will be used as the basis for assessing the necessity of future actions. Table 1 presents the rationale for the sampling locations selected for the Phase III Investigation.

3.2 Field Methodology

Field activities (i.e., drilling, well installation, soil sampling, and ground-water sampling) were conducted in accordance with applicable portions of the "Health and Safety Plan" (Appendix A) and the "Quality Assurance Project Plan" (Appendix B) of the IEPA approved *Work Plan for the Phase II Site Investigation* [GeoSyntec, 1994]. Samples from all media (soil, sediment, and ground water) collected during the Phase III Investigation were submitted to Savannah Laboratories, a Contract Laboratory Program (CLP) certified laboratory in Tallahassee, Florida under chain-of-custody protocol.

3.2.1 Shallow Boreholes and Subsurface Sampling

Shallow boreholes were advanced at IEPA-designated locations in drainage areas within the Phase III Area and near the Little Vermilion River using manually operated stainless steel environmental augers and trowels. These sampling points were identified as SED1 through SED8 at the approximate locations shown on Figure 2. The shallow borehole locations were selected to provide sufficient aerial coverage of the areas potentially impacted by: (i) unauthorized dumping; (ii) spent plating solution and wastewater discharges from the Apollo Metal Works; (iii) wastewater discharge from the Carus Chemical Company (1970 to 1975); and (iv) possible industrial discharge from M&H. The locations were selected based on visual inspection of drainage routes leading to the lowland area.

Shallow soil samples were generally collected at depths of approximately 0.5 to 1.5 ft (0.2 to 0.5 m) BLS. Table 2 presents the depth of collection, the sampling date, matrix sampled, and analyses performed for each shallow soil (e.g., sediment), and surface soil location. Soil samples designated for chemical analysis were collected and placed in the laboratory-provided sample containers, labeled, and stored in a chilled cooler. The samples were transported to the laboratory via overnight courier under chain-of-custody protocol. Soil samples submitted to the laboratory were analyzed for the TCL/TAL presented in Table 3. Based on the initial analytical results, six soil samples were selected for toxicity characteristic leaching procedure (TCLP) analysis of inorganic constituents.

3.2.2 Soil Borings and Subsurface Sampling

Four soil boring locations (SB1 through SB4) were selected to investigate potential impacts to soil from previous operations in the lowland area and to estimate the thickness of the waste fill (Figure 2). A bulldozer was used to clear a trail to facilitate drill rig access into the lowland area. The soil borings were advanced using a truck mounted all terrain drill rig (Layne Christensen Company). A copy of a 1958 aerial photograph, provided by IEPA representative Robert Casper, was reviewed to identify the location of the above-ground tanks at the Sweney Gasoline and Oil Company. Soil boring SB5 was advanced in the area where above-ground storage tanks were believed to have been located (Figure 2). All borings were logged by a geologist according to the Unified Soil Classification System (USCS). Subsurface soil samples were collected at selected intervals for: (i) visual description and classification; and (ii) laboratory analysis. Specific sampling intervals, sample description, and soil classification, are shown in the boring logs presented as Appendix A-1.

Soil samples from each of the borings were collected just below ground surface and every 5 ft (1.5 m) thereafter during borehole advancement. Generally, the near surface soil sample and the soil sample immediately below the waste material were submitted to the analytical laboratory for chemical analyses. In all, nine subsurface samples were submitted to the laboratory for chemical analysis. Table 2 summarizes the sampling intervals submitted to the laboratory and the analyses performed.

3.2.2.1 Headspace Screening

Soil samples were collected for soil headspace screening analysis using a Foxboro 128 organic vapor analyzer (OVA) equipped with a flame ionization detector (FID). The samples designated for headspace screening were split, placed in two clean mason jars, sealed with aluminum foil, and labeled. Due to the low ambient air temperatures (below 32 degrees Celsius) encountered during the field investigation, the headspace screening was performed either inside the field vehicle or the Apollo Warehouse where temperatures could be maintained slightly above 32 degrees Celsius. One of the two soil samples was screened without the activated-charcoal filter on the OVA tip to estimate the total organic vapor concentration present. The other sample was screened using an in-line, activated-charcoal filter on the OVA to isolate and estimate the methane component in the soil vapor. The OVA probe was also inserted into the top of the borehole to estimate the presence of organic vapors. Results of the OVA screening analysis are presented in Table 4.

3.2.2.2 Soil pH

Alkalinity (pH) was measured in soil samples using a portable pH meter. An aliquot of the soil sample was mixed with an equal amount of deionized water to form a soil slurry. The pH of this slurry was measured and the value recorded (Table 5). Savannah Laboratories also measured pH measurements on the soil samples submitted for analyses. As shown in Table 5, field measured pH values ranged from 6.98 to 9.95, and laboratory measured pH values ranged from 7.6 to 9.8.

3.2.3 Ground-Water Monitoring Well Installation, Development, and Sampling

3.2.3.1 Monitoring Well Installation

Ground-water monitoring well MP1 was installed within the SB4 borehole, located near the south end of the lowland area where most of the filling and wastewater discharges are believed to have occurred (Figures 2 and 3). Monitoring well MP1 was constructed using new flush threaded 2-in. (50-mm) nominal diameter Schedule 40 polyvinyl chloride (PVC) riser pipe. The screened portion of the monitoring well consisted of a 10-ft (3-m) section of 0.01-in. (0.25-mm) factory slotted casing of the same type and diameter as the riser pipe. The screened portion was placed at depths between 25 and 35 ft (8 and 11 m) BLS. The construction log for monitoring well MP1 is provided as Appendix A-2. Appendix A-3 provides photographic documentation of the fieldwork.

3.2.3.2 Monitoring Well Development

Monitoring well MP1 was developed prior to sampling. Development consisted of a combination of bailing, surging, and pumping. The monitoring well was developed to remove residual materials that may have entered the well casing during well construction and to re-establish the natural hydraulic flow conditions of the surrounding material that may have been disturbed during borehole advancement and well construction. Ground-water samples were collected in a clear glass beaker during well development to monitor general geochemical water quality parameters (i.e., specific conductance, temperature, pH, and turbidity).

3.2.3.3 Monitoring Well Sampling

Approximately five well volumes of the standing water column were purged prior to sampling. Geochemical water-quality parameters were measured during monitoring well purging. Next, a Teflon™ bailer was used to collect a ground-water sample for Volatile Organic Analyses (VOA). Finally, the peristaltic pump was used to collect a ground-water sample for analysis of the remaining TCL and TAL parameters (Table 3).

3.2.3.4 Decontamination Procedures

All drilling and sampling equipment was decontaminated prior to and after use at each boring location to prevent cross-contamination. Drilling equipment was decontaminated in the following manner:

- steam clean;
- alconox wash;
- steam clean;
- potable (tap) water rinse; and
- air dry.

Detailed decontamination procedures are presented in Attachment 2 of Appendix B of the *Field Sampling Plan for the Phase II Site Investigation* [GeoSyntec, 1994].

3.2.4 Investigation Derived Waste

All soils and liquids generated during this investigation were contained in 55-gallon drums, labeled, and stored on-site. Based on the results presented within this report, no off-site disposal is necessary. Unless otherwise directed by the IEPA, all investigation derived waste will be spread at the site.

3.2.5 Engineering Survey

Location of the borings, sediment sampling locations, and the monitoring well were established by Chamlin and Associates, Inc., professional land surveyors. Each location was surveyed to within $\pm$ 0.01 ft for elevation measurements. All survey information was referenced using the State of Illinois Plane Coordinate System.

3.2.6 Quality Assurance/Quality Control Samples

Quality assurance/quality control (QA/QC) samples consisted of field duplicates, equipment blanks, trip blanks, laboratory method blanks, and laboratory spikes (Table

6). Samples from all media collected for this investigation were analyzed by Savannah Laboratories. The samples were analyzed for TCL/TAL constituents and the analyses were run according to CLP Level IV protocol.

4. SITE ASSESSMENT AND SAMPLING RESULTS

4.1 Physical Site Setting

4.1.1 Subsurface Lithology

Each of the four borings sampled within the lowland portion of the Phase III Area were advanced through the waste/fill profile and into the underlying native deposits. Each of the four borings was terminated upon reaching auger refusal, which occurred once the bedrock surface (river bedload material) was encountered. Figure 8 presents the cross section location map and Figure 9 presents the generalized lithologic cross section developed for the Phase III Area.

The lowland area is presently covered by clay and silty clay soil to depths between 2 and 15 ft (1 and 5 m) below land surface (BLS). This surficial cover was found to be underlain by fill material. The fill material is characterized as a semi-solid, gelatinous substance, with properties similar to those of a highly sensitive clay: low compressive strength, with slight plasticity, that dewaters rapidly. Soil samples retrieved from borings SB3 and SB4 indicate that approximately 25 to 30 ft (8 to 9 m) of semi-solid fill material are present within the lowland area. The fill material was encountered at depths between 2 and 5 ft (1 and 2 m) BLS and extended to depths between 30 and 35 ft (9 and 11 m) BLS (Figure 9). The gelatinous waste fill material within the lowland area appears to be laterally extensive with a thickness of as much as 30 ft (9 m), thinning towards the east (Figure 9). As noted in boring SB2, approximately 6 ft (2 m) of semi-solid fill material were encountered on the eastern edge of the lowland area. The semi-solid fill material apparently thins (20 ft (6 m) thick) towards the northern edge of the lowland area, as noted in boring SB1. The fill material was encountered at a depth of 15 ft (5 m) at location SB1 (Figure 9).

The contact between the fill material and the natural material in the lowland area was encountered at depths ranging between 30 and 35 ft (9 and 11 m) BLS. Auger refusal was encountered at approximately 40 ft (12 m) BLS within the depressed portion of the lowland area. Material immediately underlying the fill material generally consisted of silty clay or clay. Refusal depths coincided with elevations of approximately 485 ft (148 m) above MSL which is likely the former river bottom elevation in this area (Figures 2 and 9).

4.1.2 Subsurface Hydrology

Water levels were measured in each of the soil borings during borehole advancement. Water was encountered at depths between approximately 4 and 7 ft (1 and 2 m) BLS between SB1 and SB4, respectively. Water was not encountered at sampling location SB2 located near the eastern edge of the lowland area near the lowland dewatering drainage pipe. These water levels were measured in the open boreholes, the water levels were converted to ground-water elevations after completion of the location survey (Figure 9).

Water elevation was measured at monitoring well MP1 prior to sampling. The water level was present at 8.3 ft (2.5 m) below the top of the well casing thus, the ground-water elevation was estimated to be at approximately 517 ft (158 m) above MSL. It is possible that water in the lowland area may be hydraulically connected to the Little Vermilion River, whose banks are present at approximately 500 ft (152 m) above MSL (Figure 1).

4.1.3 Ground-Water Classification

Class I and Class II standards are presented in the tables of this report for comparison to the measured values; however, because of the fill material placed in the lowland area, ground water is classified as Class II: General Resource Ground Water, according to 35 IAC Section 620.420. Furthermore, ground water within the upper 10 ft (3 m) of parent material under the fill is also classified as Class II. Moreover, the standard for several inorganic constituents does not apply to ground water within fill or within the upper 10 ft (3.1 m) of parent material under such fill. For this site, applicable constituents include manganese, nickel, and selenium.

4.2 Field Analysis And Geochemical Water Parameter Results

4.2.1 Headspace Measurements

Methane-corrected hydrocarbon readings were all below 1 part per million (ppm) within the lowland area. Headspace readings in boring SB5, located in the area where above-ground storage tanks were believed to have been located (former Sweney Gasoline and Oil Company) indicated that hydrocarbon vapors were present in the soil. Table 4 presents the results of the headspace screening conducted on selected soil samples collected during the Phase III Investigation.

4.2.2 Soil pH Measurements

Table 5 presents the results of the field and laboratory measured pH values. The pH values ranged between 6.98 and 9.95, which is indicative of neutral to basic (i.e., alkaline) type soils. Given the history of the lowland area, it was expected that these soils may be acidic type soils (former acid wastewater discharge area from Apollo Metal Works). Based on the results of the investigation, it is likely that the acid wastewater discharged to the lowland area was neutralized or buffered by other more alkaline discharges, such as the spent copper cyanide solution discharged from the Apollo Metal Works, industrial discharges from M&H, or the wastewater associated with the manufacture of permanganate.

4.2.3 Geochemical Ground-Water Parameter Measurements

Table 7 presents the temperature, pH, conductivity, and turbidity values for the ground-water samples collected from well MP1 during the Phase III Investigation. Color and odor descriptions are also provided.

Ground-water temperature values ranged between 8.4 and 11.7 degrees Celsius. The pH values measured in ground water extracted from monitoring well MP1 ranged between 7.24 and 8.87. These values are consistent with pH values of discharged effluent water previously measured at the effluent inlet which ranged between 7.2 and 9.5, and at the outlet where they ranged between 7.0 and 8.8 [Carus, 1991]. At these pH levels, metals when present, tend to precipitate based on their solubility values, and/or adsorb onto the solid matrices that may be present. Conductivity values ranged from approximately 4 to 5 milliSiemens per centimeter (mS/cm) at monitoring well MP1. Turbidity values although initially in excess of 100 nephelometric units (NTU's) decreased to below 10 NTU's after development. Monitoring well development and purging removed a majority of the particulate material introduced during drilling and well installation.

4.3 Chemical Site Setting

4.3.1 Overview

Potential constituents of concern are defined herein as constituents present at a concentration exceeding ground-water and soil cleanup criteria. Three exposure routes were evaluated: (i) inhalation; (ii) soil ingestion; and (iii) ground-water ingestion. Inhalation and soil ingestion exposure routes were evaluated by comparing the total amount of contaminant per kg of soil to a published criteria. The ground-water ingestion exposure route was evaluated several ways: by comparing measured concentrations of contaminants in ground water to published values, by comparing concentrations of contaminants in soil determined by the Toxicity Characteristic Leaching Procedure (TCLP) to published criteria (in mg/L), and by comparing applicable pH-specific soil cleanup objectives to total contaminant concentrations in soil (in mg/kg). Although current regulations allow use of the Synthetic Precipitation Leaching Procedure (SPLP), this methodology was not used in this investigation since it is a new method under the TACO rules and was not approved at the time the investigation occurred.

The cleanup criteria used for this data set were the recently promulgated Tier 1 Ground-Water and Soil Cleanup Objectives for Industrial/Commercial Properties (Tier 1 cleanup objectives) developed by the IEPA. The Tier 1 evaluation compares the concentration of contaminants detected to baseline contaminant cleanup objectives. The tiered approach allows for establishing cleanup objectives while taking into account such factors as property use, and site-specific soil and ground-water characteristics.

Site access to the Phase III Area is restricted and the property is not in use, with the exception of an occasional Carus Chemical Company employee visiting the Apollo

Warehouse or an unauthorized trespasser. For this reason, analytical results obtained during this investigation have been evaluated using the Industrial/Commercial Property Classification. The Tier 1 cleanup criteria provides screening criteria for soil ingestion, ground-water ingestion, and inhalation as potential exposure routes. The Industrial/Commercial Properties classification is protective of adults working at a site for as much as 40 hours per week. The Tier 1 screening criteria generally represent a target cancer risk of less than 10^{-6} for carcinogens and a hazard quotient of less than 1 for non-carcinogens [EPA, 1996].

4.3.2 Laboratory Analytical Results

Tables 8 through 15 present a summary of analytical results that exceed Tier 1 screening criteria for the Phase III Investigation. The tables also present the concentration-to-cleanup-level ratio (CCL) number that quantifies the proportional relationship between the detected concentration and the screening criteria. A CCL number less than 1 indicates that the measured value is less than the screening criteria. The larger the CCL number, the greater the exceedance.

As shown in Table 14, eight inorganic constituents and seven organic constituents were present in various media at concentrations exceeding Tier 1 screening criteria (Class I ground-water standards). Of those exceedances, if Class II ground-water standards are applied, the numbers of inorganic and organic constituents exceeding the Tier 1 screening criteria are reduced to five and two, respectively (Table 15). Because of the fill placed within the lowland area, the Class II ground-water classification is appropriate for this site, as previously discussed in Section 4.1.3 of this report, and in accordance with 35 IAC Part 620.

Appendix B presents a summary, by media, of constituents present above laboratory method detection limits. The analytical reports from Savannah Laboratories are voluminous. The electronic data download is provided in the disk presented as Appendix B-4. Hard copies of the analytical results will be provided upon request.

4.3.3 Quality Assurance/Quality Control Results

4.3.3.1 Field Quality Assurance/Quality Control Review

Field quality assurance/quality control (QA/QC) consisted of the following: one sediment sample duplicate (MDSED9.05/MDSED5.05) and one soil sample duplicate (MDSB6.2.5/MDSB4.2.5). Two travel and two equipment blanks were collected during the Phase III Investigation. The analytical results for the sediment duplicate set (MDSED5.05/MDSED9.05) exhibited good correlation (Table 16). The analytical results for the soil duplicate set (MDSB4.2.5/MDSB6.2.5) exhibited good correlation with minor matrix interference problems (Table 17). The results of equipment blanks and travel blanks indicate that there were trace level organic and inorganic constituents present (Table 18). These trace levels may have been present in the laboratory-provided reagent water used to prepare the equipment blanks in the field. Travel blanks were prepared by the laboratory and shipped to the field with the sample bottles. Equipment blanks were collected using laboratory-supplied reagent water.

4.3.3.2 Laboratory QA/QC Review

Holding Time Review

Analytical methods used for this investigation have an associated prescribed holding time, which is the maximum amount of time after collection that a sample may be held prior to extraction or analysis. Sample integrity becomes questionable for samples extracted and/or analyzed outside of the holding times owing to potential physical and/or chemical changes to the sample such as degradation or volatilization. Results of such analyses are suspect. The holding times for each of the sample analyses were reviewed. Samples analyses for this data set were performed within specified holding times.

Method Blank Review

Method blank samples were analyzed to check for potential sample contamination from laboratory sources (e.g., contaminated reagents, improperly cleaned laboratory equipment, or persistent contamination due to the presence of certain compounds in the ambient laboratory air). A method blank was analyzed for each day that the method was used. The method blank results indicate that cyanide (0.01 mg/l) was present in the method blank run on 27 December 1996. Minor trace levels of organic constituents (e.g., acetone, benzene, chloroform, di-n-butylphthalate, toluene) were detected as estimated values ("J" result qualifier) in method blanks run as part of this data package. These data indicate that minor organic contamination was present from laboratory sources.

4.3.3.3 QA/QC Summary

The data for the investigation has been subjected to a QA/QC review, and has been found to be of satisfactory quality. Holding times were met for all sample analyses. No significant evidence of blank contamination was found in any of the blank sample analyses. These data indicate that laboratory handling procedures did not introduce significant analytes into the environmental samples. Spike recoveries were within acceptable ranges, with minimal matrix interference. Surrogate recoveries were within limits with minor matrix interference. Matrix spike and laboratory duplicated relative percent differences were within acceptable ranges, indicating good analytical precision, and minimal matrix interference. Laboratory reporting limits were consistent with CLP Level IV requirements. Overall, the results of this QA/QC review indicate that the data set is of high quality with no limitations to its intended use.

5. DATA ASSESSMENT

5.1 Potential Constituents of Concern

As previously noted, potential constituents of concern are defined herein as constituents present at concentrations exceeding the Tier 1 screening criteria for the appropriate ground-water classification. Potential constituents of concern were identified by comparing Phase III analytical results to the Tier 1 screening criteria promulgated by the Illinois Pollution Control Board, utilizing Class II ground-water standards. Three pathways (e.g., inhalation, soil ingestion, and ground-water ingestion) were analyzed in evaluating potential constituents of concern for the soils data. The results of the data assessment are organized by: (i) drainage pathways; (ii) lowland area; (iii) Sweney Gasoline and Oil Company; and (iv) Little Vermilion River. Based on Class II ground-water standards, Table 15 shows that there are seven potential constituents of concern (five inorganic (i.e., arsenic, beryllium, chromium, manganese, and selenium) and two organic (i.e., benzo(a)pyrene and ethylbenzene) identified in the Phase III Area. However, according to IAC Section 620.420(a)(2), manganese and selenium may not be regulated for areas containing fill material.

5.2 Soils Assessment

5.2.1 Drainage Pathways

Inhalation

One potential constituent of concern (i.e., chromium) was identified in a sediment sample (SED2) collected from a drainage pathway leading to the lowland area (Table 8). Chromium was present at a concentration of 440 mg/kg, which slightly exceeds the Tier 1 screening criteria of 420 mg/kg. Analytical results indicate that no other inorganic or organic constituents were present above Tier 1 screening criteria for the human inhalation exposure route in soil samples collected from the drainage pathways.

Soil Ingestion

Potential constituents of concern were identified in shallow soils collected from drainage pathways leading to the lowland area (Table 9). Water was not present in the drainage pathways during sampling. Benzo(a)pyrene was present in sediments from location SED1 at a concentration of 1,100 µg/kg and at location SED2 at a concentration of 2,000 µg/kg. Both exceed the Tier 1 screening criteria (800 µg/kg) for the ingestion pathway. No other organic analytes exceeded Tier 1 screening criteria for the ingestion pathway. Arsenic exceeded the Tier 1 cleanup objective (3 mg/kg) for ingestion in all sediment samples. Arsenic concentrations ranged from 7.7 to 71.5 mg/kg. Beryllium slightly exceeded the Tier 1 screening criteria (1 mg/kg) for the ingestion pathway in six of the sediment samples collected. Beryllium concentrations ranged from 1.1 to 2.1 mg/kg.

Ground-Water Ingestion

Carbazole (690 µg/kg) was present at location SED1 above the Class I ground-water Tier 1 screening criteria for the soil component of the ground-water ingestion route (600 µg/kg), but well below the standard for Class II ground water (2,800 µg/kg). Benzo(a)anthracene (2,800 µg/kg) was present at location SED2 above the Class I Tier 1 screening criteria for the soil component of the ground-water ingestion route (2,000 µg/l), but well below the standard for Class II ground water (8,000 µg/kg) (Table 10). No other organic analytes were present in sediment samples above Class I or II ground-water Tier 1 screening criteria for the soil component of the ground-water ingestion route.

Results of the TCLP analysis indicate that cadmium (65.3 µg/l) and manganese 477 µg/l) exceeded the Class I ground-water standards (5 µg/l and 150 µg/l, respectively) in SED1 (Table 10); however, only cadmium exceeded the Class II ground-water standard (50 µg/l). Results of the total analysis indicate that cadmium (11.3 mg/kg) slightly exceeded the pH-specific cleanup objective for Class I ground water (11 mg/kg); however, was well below the pH-specific cleanup objective Class II ground water (110 mg/kg). GeoSyntec notes that no pH-specific cleanup objectives exist in the Tier I screening criteria for the soil component of the ground-water ingestion route for manganese.

5.2.2 Lowland Area

Inhalation

No organic compounds exceeding Tier 1 screening criteria were present in the soil samples collected from the lowland area for the inhalation pathway (Table 11). Arsenic and manganese were present at concentrations slightly above Tier 1 screening criteria (1,200 and 91,000 mg/kg, respectively) in two of the ten soil samples collected from the lowland area. Arsenic (1,250 mg/kg) exceeded the Tier 1 screening criteria on one occasion, and manganese (102,000 and 126,000 mg/kg) exceeded on two occasions. No other inorganic constituents exceeded Tier 1 screening criteria for the inhalation pathway.

Soil Ingestion

Potential constituents of concern were identified in the subsurface soil samples collected from the lowland area for the soil ingestion pathway (Table 12). No organic compounds were present in the soil samples collected from the lowland area in excess of Tier 1 screening criteria for the ingestion pathway. Three inorganics (i.e., arsenic, beryllium, and manganese) exceeded Tier 1 screening criteria for the ingestion pathway. Arsenic concentrations in excess of the Tier 1 screening criteria (3 mg/kg) for the ingestion pathway were present in all of the subsurface soil samples collected from the lowland area. Arsenic concentrations in excess of Tier 1 screening criteria ranged between 17.8 and 1,250 mg/kg. Beryllium concentrations in excess of the Tier 1 screening criteria (1 mg/kg) was present in five of the ten subsurface soil samples collected from the lowland area. Beryllium concentrations in excess of Tier 1 screening criteria ranged between 1.3 and 4 mg/kg. Manganese in excess of the Tier 1 screening criteria (100,000 mg/kg) for the ingestion pathway was present in two subsurface soil samples (102,000 and 126,000 mg/kg). No other inorganic constituents were present above the Tier 1 screening criteria for the ingestion pathway.

Ground-Water Ingestion

No organic constituents were present in lowland subsurface soil samples above Tier 1 screening criteria for the soil component of the ground-water ingestion route (Table 13). GeoSyntec notes that the exceedances shown in Table 13 are associated with soil samples obtained from the former Sweney Gasoline and Oil Company area.

TCLP analyses indicated that cadmium and manganese were present in soil samples from borings SB1 and SB4 at concentrations exceeding the Tier 1 screening criteria for the soil component of the ground-water ingestion route (Class I ground water). Nickel, lead, and selenium were present in soil obtained from boring SB4 at concentrations exceeding the Tier 1 screening criteria for the soil component of the ground-water ingestion route (Class I ground water) (Table 13). Manganese and selenium were present at concentrations exceeding the Tier 1 screening criteria for the soil component of the ground-water ingestion route (Class II ground water). Based on pH-specific soil cleanup objectives, selenium was the only inorganic constituent found in excess of Tier 1 cleanup objectives (Class I or II). GeoSyntec notes that no pH-specific cleanup objectives exist in the Tier 1 screening criteria for the soil component of the ground-water ingestion route for manganese or lead.

5.2.3 Sweney Gasoline and Oil Company Area

Inhalation

Analytical results indicate that no inorganic or organic constituents were present above Tier 1 screening criteria for the human inhalation exposure route in soil samples collected from the Sweney Gasoline and Oil Company Area (Table 11).

Soil Ingestion

Arsenic (10.2 mg/kg) was detected in one soil sample above Tier 1 screening criteria (3 mg/kg) for the soil ingestion exposure route (Table 12).

Ground-Water Ingestion

Four organic constituents (carbon tetrachloride, toluene, ethylbenzene, and 1,2-dichloroethane) were present above Tier 1 screening criteria for the soil component of the ground-water ingestion route (Table 13). Carbon tetrachloride (110 J μg/kg), toluene (13,000 B), and ethylbenzene (20,000 B) were present in the soil sample collected from SB5 at a depth of 5 ft (2 m) BLS slightly above Tier 1 screening criteria for Class I ground water (70 μg/kg, 12,000 μg/kg, and 13,000 μg/kg, respectively). Ethylbenzene slightly exceeded the Tier I screening criteria for Class II ground water (19,000 μg/kg). Carbon tetrachlorida and toluene were below Tier I screening criteria for Class II ground water (330 μg/kg and 29,000 μg/kg, respectively). 1,2-Dichloroethane (31 μg/kg) was present in the soil sample collected from boring SB5 sampled at a depth of 11 ft (3.4 m) BLS. This concentration exceeded the Tier 1 screening criteria for the soil component of the ground-water ingestion route (Class I ground water) (20 μg/kg); but did not exceed the Tier I screening criteria for Class II ground water (100 μg/kg). No other constituents (inorganic or organic) exceeded applicable regulations or Tier 1 screening criteria.

5.2.4 Little Vermilion River

Inhalation

Analytical results indicate that no inorganic or organic constituents were present above Tier 1 screening criteria for the human inhalation exposure route in sediments collected from the Little Vermilion River (Table 8).

Soil Ingestion Pathway

One potential constituent of concern (i.e., arsenic) was identified in the sediment samples collected from the Little Vermilion River (Table 9). The arsenic concentration ranged from 5.4 to 10.7 mg/kg. The Tier 1 screening criteria is 3 mg/kg for the ingestion pathway.

Ground-Water Ingestion

Based on total analysis for organics, there were no exceedances of Tier 1 screening criteria for migration to Class I or II ground water.

Results of the TCLP analysis indicate that cadmium and manganese exceeded the Class I ground-water standards for the soil component of the ground-water ingestion route (Table 10). Cadmium (11.3 μg/l) exceeded the standard for Class I ground water (5 μg/l), but did not exceed the Class II ground-water standard (50 μg/l). Manganese (1,290 μg/l) exceeded the standard for Class I ground water (150 μg/l), but did not exceed the Class II standard (10,000 μg/l). Based on total analysis, there was one exceedance (i.e., chromium) of pH-specific soil cleanup objectives for the sediment samples collected from the Little Vermilion River. Chromium was present at a concentration of 40.1 mg/kg in SED7. The pH-specific Tier 1 screening criteria for Class I ground water is 28 mg/kg for hexavalent chromium. The analyses performed for evaluation of chromium does not differentiate hexavalent and trivalent chromium. There is no pH-specific Tier I screening criteria for Class II ground water for chromium.

5.3 Ground-Water Assessment

No potential constituents of concern were identified in the ground-water sample collected from well MP1 installed in the southern portion of the lowland area (Figure 2). Although manganese (1,220 μg/l) exceeded the Illinois primary drinking water standard for Class I ground water (150 μg/l), according to 35 IAC Section 620.420(a)(3), the manganese standard does not apply to ground water within fill material, or within the upper 10 ft (3 m) of parent material under such fill. GeoSyntec notes that manganese did not exceed the Illinois standard for Class II ground water (10,000 μg/l). Other than manganese, no other analytes exceeded Illinois Class I ground-water standards.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of Phase III Investigation

The Phase III Investigation includes the Northern Undeveloped Area (i.e., the Phase III Area) located approximately 3,500 ft (1,067 m) north of the Carus Chemical Company Manufacturing Facility in La Salle, Illinois. The Phase III Area (historically referred to as "The Muddies") consists of a lowland which was originally part of the Little Vermilion River prior to re-arrangement of its course. The investigation was performed to gather data to evaluate the presence of chemical constituents in soils and/or ground water within the Phase III Area which may be associated with historical site operations, and to provide information about the site-specific geologic, hydrogeologic, and geochemical conditions.

Spent plating solutions and wastewater associated with plating operations at the Apollo Metal Works was discharged into the lowland area (mid 1920's to mid 1930's). An agreement was in place during the 1970's for discharge of industrial waste products om M&H into the lowland area. Wastewater associated with Carus Chemical Company operations (e.g., manufacture of permanganate and hydroquinone) was also discharged to the lowland area between the years of 1970 and 1975. Although fences and signs are present around most of the Phase III Area, there is evidence of unauthorized dumping.

Potential constituents of concern (i.e., those constituents present at concentrations exceeding Tier 1 screening criteria) were identified as a result of the soil, sediment, and ground-water sampling. Tables 14 and 15 present a summary of the potential constituents of concern detected in each media sampled during the Phase III Investigation.

6.2 Concluding Statements

The results of the Phase III Investigation are summarized below.

Overview of Health Risks

The site is not an imminent threat to human health. The ground-water sample meets IEPA standards and should be considered safe. The soils contain various constituents above Tier 1 screening criteria; however, the area is fenced and posted. Exposure may occur for unauthorized trespassers; however, incidences are isolated.

Ground-Water Classification

As discussed in Section 4.1.3, Ground water within the Phase III area is classified as Class II: General Resource Ground Water, according to 35 IAC Section 620.420 because of the fill placed in the lowland area. Furthermore, ground water within the upper 10 ft (3 m) of parent material under the fill is also classified as Class II. Nevertheless, Class I and Class II standards are presented in the tables of this report for comparison to the measured values. In addition, GeoSyntec notes that standards for manganese, nickel, and selenium do not apply to ground water within fill or within the upper 10 ft (3.1 m) of parent material under such fill.

pH Results

- Soil pH values ranged between 6.98 and 9.95, indicating that the site is characterized by neutral to basic soils. The pH values measured in the ground-water samples ranged between 7.24 and 8.86, also indicating neutral to basic conditions. As previously mentioned, at these pH levels, soluble metals tend to precipitate and/or sorb onto the solid matrices that may be present, based on the solubility value of the specific metal. The laboratory analyses of the ground-water sample supports this statement (i.e., except for manganese, no exceedances of Class I ground-water standards were measured).

Extent of Waste Fill in Lowland Area

- The semi-solid waste filled portion in the lowland area has a thickness between 11 and 35 ft (3 and 11 m) based on the soil borings sampled.

- The waste filled portion is approximately 35 ft (11 m) thick in the area (SB4) nearest the Apollo Warehouse. Laterally it becomes thinner away from this area towards the northern edge of the property (SB1) where it is approximately 20 ft (6 m) thick and towards the eastern edge of the lowland it is approximately 11 ft (3 m) thick.

Inorganic Results

- Arsenic, beryllium, and manganese are the primary constituents of concern based on the number of exceedances above Tier 1 screening criteria; however, manganese standards may not apply to this site.

- Arsenic exceeded Tier 1 screening criteria for soil ingestion (sediment and subsurface soil samples) and inhalation (one subsurface soil sample only); however, did not exceed ground-water standards for the soil component of the ground-water ingestion pathway, and was not present above Illinois primary drinking water standards or Class I or II standards in the ground water.

- Beryllium exceeded Tier 1 screening criteria for soil ingestion (sediment and subsurface samples); however, did not exceed inhalation criteria, or ground-water standards for the soil component of the ground-water ingestion pathway, and was not present above Illinois primary drinking water standards or Class I or II standards in the ground water.

- Manganese exceeded Tier 1 screening criteria for soil ingestion and inhalation (subsurface samples only), and Tier 1 ground-water standards (based on TCLP analysis) for Class I and II ground water. Manganese (1,220 μg/l) was the only constituent present in ground water exceeding the Illinois primary drinking water standard, Class I (150 μg/l). However, Class II ground-water standards are applicable to this area; there were no exceedances of Class II standards. Moreover, manganese standards do not apply to ground water within fill, such as found in the lowland area.

- Cadmium, chromium, lead, nickel, and selenium exceeded Class I ground-water standards (based on TCLP analysis); cadmium and selenium also exceeded Class

II ground-water standards. GeoSyntec notes that the pH of the ground water varied from approximately 7 to over 9, and was greater than the pH of the TCLP extraction solution (approximately 5). None of these constituents exceeded Illinois primary drinking water standards (Class I or II) in the ground-water sample.

- TCLP analyses were performed on three soil samples, two sediment samples, and one sample collected within the waste-filled portion of the lowland area. Cadmium, chromium, lead, manganese, nickel, and selenium exceeded the Tier 1 screening criteria for the soil component of the ground-water ingestion pathway (Class I ground water), as reflected in the exceedances discussed above. Cadmium, manganese, and selenium exceeded the tier I screening criteria for the soil component of the ground-water ingestion pathway (Class II ground water). However, manganese and selenium standards do not apply to ground water within fill or within the upper 10 ft (13 m) of parent material under such fill.

- As previously noted, TCLP methods were used to analyze sediment and soil samples. The TCLP extraction solution is at a pH of approximately 5. SPLP methods would generally provide more appropriate results for this site given the pH of the ground water and soil. SPLP extraction is performed at the pH of rainwater (approximately neutral), which is much greater than the pH of the TCLP extraction solution. For most inorganics, lower concentrations would have been measured with the SPLP method since metals are generally more soluble at a lower pH than at a higher pH. At the time the samples were collected and analyzed, the SPLP method was not approved in the Illinois regulations as an alternative to the TCLP method.

Organic Results

Organic exceedances of Tier 1 screening criteria were isolated:

- 1,2-Dichloroethane (1,2-DCA), carbon tetrachloride, toluene, and ethylbenzene exceeded the Tier 1 screening criteria for migration to Class I ground water in the soil sample collected in the area suspected of housing the above-ground tanks at the Sweney Gasoline and Oil Company. The CCL ratio for Class I ground water varied from 1.08 to 1.57, indicating only slight exceedances. There were no exceedances of Class II ground-water standards, with the exception of a slight exceedance of ethylbenzene (CCL = 1.05).

- Benzo(a)pyrene exceeded Tier 1 soil cleanup objectives for ingestion as the possible exposure route, and was present in sediment samples (SED1 and SED2) collected from the drainage pathways.

- Carbazole (one exceedance, SED1) and benzo(a)anthracene (one exceedance, SED2) exceeded Tier 1 screening criteria for migration to Class I ground water in drainage pathway sediment samples; neither exceeded migration to Class II ground water.

Primary Constituents of Concern and Potential Sources

- Several sources for these inorganic constituents exist or previously existed: (i) the Apollo Metal Works was a plating company that reportedly discharged spent solutions and wastewater to the lowland area; (ii) M&H, which was involved with smelting and rolling of zinc, coal mining for zinc processing, and manufacture of sulfuric acid and ammonium sulfate fertilizer; (iii) Carus Chemical Company which piped wastewater generated during ore purification and hydroquinone production to the lowland area; and (iv) unauthorized disposal of white goods, and other miscellaneous waste.

- As previously discussed, arsenic, beryllium, and manganese are the primary constituents of concern. Arsenic may be associated with discharges from the Apollo Metal Works and M&H, or from ore impurities present in the wastewater from the permanganate manufacturing process (Carus Chemical Company). Historically, the manganese ore was characterized by a higher percentage of arsenic relative to the ore currently used. Beryllium is found naturally in soils, ground water, and surface waters, and is used often in electrical equipment and electrical components. Its presence in the lowland area may be attributable to natural sources, run-off from coal mining operations, discharge from Apollo Metal Works, unauthorized dumping of white goods (e.g., electrical components), other M&H operations, or from impurities in the manganese ore (Carus Chemical

Company). GeoSyntec notes that the ore was not typically analyzed for beryllium. Beryllium is always found in the combined state, usually in the form of complex silicates and aluminates. The presence of manganese is most likely attributable to various sources, including plating operations (Apollo Metal Works), zinc rolling (M&H), and permanganate wastewater historically discharged to the lowland area (see discussion Section 2.3). However, manganese is a necessary nutrient for human health and is a commonly found element, ranking eighth among the metals in order of abundance in the earth's crust.

- Isolated and low-level exceedances of Tier 1 screening criteria were found for other metals (i.e., cadmium, chromium, lead, nickel, and selenium). The source of these exceedances (for sediment and subsurface soil samples within the lowland area), may be related to wastewater discharges associated with historic plating operations of the Apollo Metal Works (chromium and nickel are often used in electroplating), historical M&H operations (particularly mining and refining operations), impurities in the manganese ore (Carus Chemical Company), or to the natural distribution of elements within the area soils.

- 1,2-DCA, carbon tetrachloride, toluene, and ethylbenzene were isolated to the former Sweney Gasoline and Oil Company area. The source of 1,2-DCA and carbon tetrachloride is likely degreasing solvents associated with operations (e.g., cleaning parts, etc.) and the source of toluene and ethylbenzene is likely petroleum fuel spills. Toluene is also found in toluene-based solvents.

- Isolated exceedances of Tier 1 screening criteria were found for benzo(a)anthracene, benzo(a)pyrene, and carbazole in SED1 and SED2, which were located along the same drainage pathway. All of these constituents are classified as polyaromatic hydrocarbons (PAHs), which may be found in coal tar, creosote, or motor or crank oils, as well as other sources. The source of these exceedances is likely either related to creosote associated with the nearby railroad (e.g., railroad ties, emission smoke, etc.) or with isolated incidences of oil spillage associated with the roadway leading into the lowland area. Both the abandoned ICG Railroad embankment and access roadway are located nearby to the drainage pathway where SED1 and SED2 were collected.

6.3 Recommendations for Further Action

Based on the results of the Phase III Investigation and the Tier 1 evaluation, GeoSyntec recommends "no further remediation" for those constituents that do not exceed the Tier 1 ground-water and soil screening criteria for all applicable exposure routes. Although the analytical results for soil, sediment, and ground water (assuming an industrial/commercial scenario) indicate that there are no immediate threats to human health and the environment, a Tier 2 evaluation may be appropriate for those constituents exceeding Tier 1 screening criteria (Tables 14 and 15) in accordance with 35 IAC Part 742 entitled "*Tiered Approach to Corrective Action Objectives (TACO)*". A Tier 2 evaluation would address whether remedial action is necessary for those constituents that exceed Tier 1 soil and ground-water screening criteria.

7. REFERENCES

Mr. Carus, Paul II, Telephone Interview, 10 February 1997.

GeoSyntec Consultants, "Preliminary Site Investigation Report", Carus Chemical Company, June 1993.

GeoSyntec Consultants, "Draft Phase I Site Investigation Report", Carus Chemical Company Manufacturing Facility, La Salle, Illinois, January 1994.

GeoSyntec Consultants "Proposed Work Plan for Phase I Site Investigation-Carus Chemical Company Manufacturing Facility, La Salle, Illinois", October 1993.

GeoSyntec Consultants, "Proposed Work Plan for Phase II Site Investigation-Carus Chemical Company Manufacturing Facility, La Salle, Illinois", February 1994.

GeoSyntec Consultants, "Phase II Site Investigation Completion Report, Carus Chemical Company Manufacturing Facility, La Salle, Illinois, January 1996.

GeoSyntec Consultants, "Sampling and Analysis Plan for Proposed Soil, Sediment, and Water Investigations at the Northern Undeveloped Area", 20 June 1996.

IEPA "CERCLA Preliminary Assessment Report", Carus Chemical Company, undated, received by Carus Chemical Company on 23 September 1991.

IEPA "CERCLA Cleanup Site Inspection Report", Carus Chemical Company, 2 December 1992.

IEPA "CERCLA Integrated Site Assessment Matthiessen & Hegeler Zinc Co.", 1993.

Illinois Pollution Control Board, "Tiered Approach to Corrective Action Objectives", 35 IAC, Part 742, 5 June 1997.

USEPA, "RCRA Ground-Water Monitoring Technical Enforcement Guidance Document", Office of Solid Waste and Emergency Response OSWER 9950.1, September 1986 .

USEPA, "Remediation of Contaminated Sediments", Office of Research and Development, USEPA/625/6-91/028, April 1992.

USGS, "La Salle Quadrangle", La Salle, Illinois 15 Minute Quadrangle Topographic Series, 1966.

Table 1. Summary of Rationale For Sample Types And Locations
Phase III Area

Sample	Location Rationale	Analysis Performed	Overall Rationale
Shallow Boreholes			
SED1 through SED6	Selected to provide aerial coverage of areas where potential contaminants may be present.	TCL/TAL	Samples will enable the assessment of potential constituents in the drainage areas within the Phase III Area
SED7	To assess conditions downgradient of the overflow pipe.	TCL/TAL	Assess the presence of constituents potentially due to discharge.
SED1 and SED 7	Locations where metal concentrations exceeded Tier 1 screening criteria.	TCLP	Assess the toxicity characteristics of inorganic constituents present.
SED8	To assess conditions near the river upgradient of the overflow pipe.	TCL/TAL	Assess potential constituents present upgradient of the overflow pipe.
Soil Borings			
SB1 through SB4	Advanced in the filled portion of the lowland area.	TCL/TAL	To delineate the presence and thickness of the filled portion within the lowland area.
SB5	Advanced at the location where the above ground tanks may have been.	TCL/TAL	To identify the presence of constituents associated with operations at the Sweney Gasoline and Oil Company.
SB1 and SB4	Locations where metal concentrations exceeded Tier 1 screening criteria.	TCLP	Assess the toxicity characteristics of inorganic constituents present.
Monitoring Well			
MP1	Installed within the lowland area.	TCL/TAL	Evaluate impacts to ground water within the lowland area.

TCL = Target Compound List.
TAL = Target Analyte List.
TCLP = Toxicity Characteristic Leaching Procedure.

Table 2. Summary of Sampling Location and Depth
Phase III Investigation

Sample Identification	Sampling Location	Depth of Sample Collection (ft BLS)	Sampling Date	Matrix Sampled	Analysis Requested
Shallow Soil/Sediment					
MDSED1.2.5	SED1	2.5 to 3.0	12/12/96	soil	TCL/TAL
MDSED1.2.5	SED1	2.5 to 3.0	12/12/96	soil	TCLP
MDSED2.0.8	SED2	0.8 to 1.3	12/12/96	soil	TCL/TAL
MDSED3.0.5	SED3	0.5 to 1.0	12/13/96	soil	TCL/TAL
MDSED4.0.5	SED4	0.5 to 1.0	12/13/96	soil	TCL/TAL
MDSED5.0.5	SED5	0.5 to 1.0	12/13/96	soil	TCL/TAL
MDSED6.0.5	SED6	0.5 to 1.0	12/13/96	soil	TCL/TAL
MDSED7.0.5	SED7	0.5 to 1.0	12/13/96	sediment	TCL/TAL
MDSED7.0.5	SED7	0.5 to 1.0	12/13/96	sediment	TCLP
MDSED8.05	SED8	0.5 to 1.0	12/13/96	sediment	TCL/TAL
Subsurface Soil					
MDSB1.0.5	SB1	0.5 to 1.0	12/10/96	soil	TCL/TAL
MDSB1.0.5	SB1	0.5 to 1.0	12/10/96	soil	TCLP
MDSB1.35	SB1	35 to 36	12/10/96	soil	TCL/TAL
MDSB1.35	SB1	35 to 36	12/10/96	soil	TCLP
MDSB2.0.5	SB2	0.5 to1.0	12/11/96	soil	TCL/TAL
MDSB3.0.5	SB3	0.5 to1.0	12/13/96	soil	TCL/TAL
MDSB3.37	SB3	37 to 38	12/13/96	soil	TCL/TAL
MDSB4.0.5	SB4	0.5 to 1.0	12/13/96	soil	TCL/TAL
MDSB4.0.5	SB4	0.5 to 1.0	12/13/96	soil	TCLP
MDSB4.25	SB4	25 to 26	12/13/96	soil	TCL/TAL
MDSB4.25	SB4	25 to 26	12/13/96	soil	TCLP
MDSB5.0.5	SB5	0.5 to 1.0	12/13/96	soil	TCL/TAL
MDSB5.11	SB5	11 to 12	12/13/96	soil	TCL/TAL

TCL = Target Compound List.
TAL = Target Analyte List.
TCLP = Toxicity Characteristic Leaching Procedure.

Table 3. CERCLA Program Target Compound List/Target Analyte List

VOLATILE ORGANIC COMPOUNDS	
Chloromethane	1,2-Dichloropropane
Bromomethane	cis-1,3-Dichloropropene
Vinyl Chloride	Trichloroethene
Chloroethane	Dibromochloromethane
Methylene Chloride	1,1,2-Trichloroethane
Acetone	Benzene
Carbon Disulfide	trans-1,3-Dichloropropene
1,1-Dichloroethene	Bromoform
1,1-Dichloroethane	4-Methyl-2-Pentanone
1,2-Dichloroethene (total)	2-Hexanone
Chloroform	Tetrachloroethene
1,2-Dichloroethane	1,1,2,2-Tetrachloroethane
2-Butanone	Toluene
1,1,1-Trichloroethane	Chlorobenzene
Carbon Tetrachloride	Ethylbenzene
Vinyl Acetate	Styrene
Bromodichloromethane	Xylenes (total)
SEMI-VOLATILE CONSTITUENTS (BASE/NEUTRAL ORGANICS)	
Hexachloroethane	2,4-Dinitrotoluene
bis (2-Chloroethyl) Ether	Diethylphthalate
Benzyl Alcohol	N-Nitrosodiphenylamine
bis (2-Chloroisopropyl) Ether	Hexachlorobenzene
N-Nitroso-Di-n-Propylamine	Phenanthrene
Nitrobenzene	4-Bromophenyl-Phenylether
Hexachlorobutadiene	Anthracene
2- Methylnaphthalene	Di-n-Butylphthalate
1,2,4-Trichlorobenzene	Fluoranthene
Isophorone	Pyrene
Naphthalene	Butylbenzylphthalate
4-Chloroaniline	bis (2-Ethylhexyl) Phthalate
bis (2-chloroethoxy) Methane	Chrysene
Hexachlorocyclopentadiene	Benzo (a) Anthracene
2-Chloronaphthalene	3,3'-Dichlorobenzidene
2-Nitroaniline	Di-n-Octyl Phthalate
Acenaphthylene	Benzo (b) Fluoranthene
3-Nitroaniline	Benzo (k) Fluoranthene
Acenaphthene	Benzo (a) Pyrene
Dibenzofuran	Indeno (1,2,3-cd) Pyrene
Dimethyl Phthalate	Dibenzo (a,h) Anthracene
2,6-Dinitrotoluene	Benzo (g,h,i) Perylene
Fluorene	1,2-Dichlorobenzene
4-Nitroaniline	1,3-Dichlorobenzene
4-Chlorophenyl-Phenylether	1,4-Dichlorobenzene

Table 3. CERCLA Program Target Compound List/Target Analyte List (continued)

SEMI-VOLATILE CONSTITUENTS (ACID EXTRACTABLE ORGANICS)	
Benzoic Acid	2,4,6-Trichlorophenol
Phenol	2,4,5-Trichlorophenol
2-Chlorophenol	4-Chloro-3-Methylphenol
2-Nitrophenol	2,4-Dinitrophenol
2-Methylphenol	2-Methyl-4,6-Dinitrophenol
2,4-Dimethylphenol	Pentachlorophenol
4-Methylphenol	4-Nitrophenol
2,4-Dichlorophenol	
PESTICIDES AND PCB TARGET CONSTITUENTS	
alpha-BHC	Endrin Ketone
beta-BHC	Endosulfan Sulfate
delta-BHC	Methoxychlor
gamma-BHC (Lindane)	alpha-Chlorodane
Heptachlor	gamma-Chlorodane
Aldrin	Toxaphene
Heptachlor epoxide	Aroclor-1016
Endosulfan I	Aroclor-1221
4,4'-DDE	Aroclor-1232
Dieldrin	Aroclor-1242
Endrin	Aroclor-1248
4,4'-DDD	Aroclor-1254
Endosulfan II	Aroclor-1260
4,4'-DDT	
INORGANIC CONSTITUENTS	
Aluminum	Mercury
Antimony	Nickel
Arsenic	Potassium
Barium	Selenium
Beryllium	Silver
Cadmium	Sodium
Calcium	Thallium
Chromium	Tin
Cobalt	Vanadium
Copper	Zinc
Iron	Cyanide
Lead	Sulfide
Magnesium	Sulfate
Manganese	

Table 4. Summary Of Soil OVA Results
Phase III Investigation

Soil Sample Identification	Station Identification	Depth (ft)	OVA Reading (ppm)	Methane Filter Reading (ppm)	Methane Corrected Hydrocarbon Reading (ppm)	Field Observation
MDSB1.0.5	SB1	0.5 - 2.5	< 1	-	-	No Odor
MDSB1.5	SB1	5 - 7	< 1	-	-	No Odor
MDSB2.0.5	SB2	0.5 - 2.5	< 1	-	-	No Odor
MDSB2.5	SB2	5 - 7	< 1	-	-	No Odor
MDSB3.0.5	SB3	0.5 - 2.5	< 1	-	-	No Odor
MDSB3.5	SB3	5 - 7	< 1	-	-	No Odor
MDSB4.0.5	SB4	0.5 - 2.5	< 1	-	-	No Odor
MDSB4.2.5	SB4	2.5 - 4.5	< 1	-	-	No Odor
MDSB5.0.5	SB5	0.5 - 2.5	>1000	10	990	Strong Fuel Odor
MDSB5.5	SB5	5 - 7	900	10	890	Strong Fuel Odor
MDSB5.10	SB5	10 - 12	< 1	-	-	No Odor
MDSB5.15	SB5	15 - 17	25	10	15	No Odor
Inside SB-5 borehole	SB5	-	100	-	100	Slight Fuel Odor

- = Not Measured.

Table 5. Summary of Field and Laboratory Measured pH Values Phase III Investigation

Sample Identification	pH Value Measured	
	Field	Laboratory
MDSED1.1	7.82	NM
MDSED1.2.5	6.98	8.3
MDSED2.0.8	NM	8.3
MDSED3.0.5	NM	8.5
MDSED4.0.5	NM	8.4
MDSED5.0.5	NM	8.0
MDSED6.0.5	NM	8.4
MDSED7.0.5	NM	7.9
MDSED8.0.5	NM	8.0
MDSB1.0.5	7.63	8.4
MDSB1.10	9.95	NM
MDSB1.22	NM	9.8
MDSB1.35	9.67	7.9
MDSB2.0.5	7.67	7.6
MDSB2.15	7.96	NM
MDSB3.0.5	NM	7.6
MDSB3.15	9.65	NM
MDSB3.20	9.45	NM
MDSB3.37	NM	9.2
MDSB4.0.5	9.67	7.6
MDSB4.10	9.45	NM
MDSB4.15	9.54	NM
MDSB4.25	NM	9.7
MDSB5.0.5	NM	8.4
MDSB5.11	NM	8.8

NM= Not Measured.

Table 6. Summary of QA/QC Samples Collected
Phase III Investigation

Sample Type	Sample Identification	Matrix Sampled	Analysis Performed	Date Sampled
Trip Blank				
	TB2CB591	water	Volatile Compounds	12/10/96
	TB3CB591	water	Volatile Compounds	12/16/96
Equipment Blank				
	MDEB1SED	water	TCL/TAL	12/13/96
	MDEB2GW1	water	TCL/TAL	12/16/96
Duplicates				
	MDSED9.0.5	soil	TCL/TAL	12/13/96
	MDSB6.2.5	soil	TCL/TAL	12/13/96

TCL = Target Compound List.
TAL = Target Analyte List.

Table 7. Summary of Ground-W[illegible] Geochemical Parameters Measured
Phase III Investigation

Gallons Purged	pH	Temperature °C	Conductivity mS/cm	Salinity (%)	Turbidity NTUs	Color	Odor	Comments
Development								
5	7.24	8.4	3.99	0.19	73	brown	none	1355 start pumping silty water
10	8.68	9.2	4.21	0.21	2100	dk. brown	none	muddy water
								pumped well dry, wait allow for recovery resume pumping
12	NR	NR	NR	NR	NR	NR	NR	pumped dry, allow to recover
15	8.71	8.6	4.81	0.24	999	dk. brown	none	pump
20	8.63	10	4.25	0.21	57	dk. brown	none	stop wait 10 minutes restart
30	8.67	10	4.26	0.23	1000	dk. brown	none	purged dry
Purging								
3	8.71	11.7	5.04	0.01	10	clear	none	none
5	8.79	10.7	5.24	0.01	3	clear	none	none
8	8.80	10.5	5.15	0.01	4	clear	none	none
10	8.84	10.6	5.18	0.01	3	clear	none	none
13	8.79	10.5	5.2	0.01	2	clear	none	none
15	8.87	10.4	5.19	0.01	11	clear	none	becoming slightly turbid
18	8.85	10.4	5.17	0.01	2	clear	none	none
Post Sampling								
22	8.86	9.3	5.15	0.01	2	clear	none	post sampling values

°C = Degrees Celsius.
mS/cm = millisiemens per centimeter.
% = percent.
NTUs = nephelometric units.
NR = no readings.

**Table 8. Summary of Shallow Soil (i.e., Sediment) Exceeding Sample Results
Tier 1 Screening Criteria for
Industrial/Commercial Properties - Inhalation Pathway**

Sample ID	Sample Location	Date Sampled	Analyte	Detected Concentration	Units	Inhalation Screening Criteria	CCL
MDSED2.0.8	Drainage Pathway	12/12/96	Chromium	440	mg/kg	420	1.05

mg/kg = milligrams per kilogram.
CCL = ratio of detected analyte concentration to analyte cleanup level.
Inhalation Screening Criteria from Illinois Pollution Control Board, "Tiered Approach to Corrective Action Objectives" (5 June 1997).

Table 9. Summary of Shallow Soil (i.e., Sediment) Sample Results
Exceeding Tier 1 Screening Criteria for
Industrial/Commercial Properties - Soil Ingestion Pathway

Sample ID	Sample Location	Date Sampled	Analyte	Detected Concentration	Units	Ingestion Screening Criteria	CCL
MDSED1.2.5	Drainage Pathway	12/12/96	Benzo(a)pyrene	1,100	µg/kg	800	1.38
MDSED1.2.5		12/12/96	Arsenic	14.5	mg/kg	3	4.83
MDSED1.2.5		12/12/96	Beryllium	1.5	mg/kg	1	1.50
MDSED2.0.8	Drainage Pathway	12/12/96	Benzo(a)pyrene	2,000	µg/kg	800	2.50
MDSED2.0.8		12/12/96	Arsenic	18.6	mg/kg	3	6.20
MDSED2.0.8		12/12/96	Beryllium	1.8	mg/kg	1	1.80
MDSED3.0.5	Drainage Pathway	12/13/96	Arsenic	71.5	mg/kg	3	23.83
MDSED3.0.5		12/13/96	Beryllium	1.3	mg/kg	1	1.30
MDSED4.0.5	Drainage Pathway	12/13/96	Arsenic	7.7	mg/kg	3	2.57
MDSED4.0.5		12/13/96	Beryllium	2.1	mg/kg	1	2.10
MDSED5.0.5	Drainage Pathway	12/13/96	Arsenic	23.8	mg/kg	3	7.93
MDSED5.0.5		12/13/96	Beryllium	1.1	mg/kg	1	1.10
MDSED6.0.5	Drainage Pathway	12/13/96	Arsenic	12.6	mg/kg	3	4.20
MDSED6.0.5		12/13/96	Beryllium	1.6	mg/kg	1	1.60
MDSED7.0.5	Little Vermilion River	12/13/96	Arsenic	10.7	mg/kg	3	3.57
MDSED8.0.5	Little Vermilion River	12/13/96	Arsenic	5.4	mg/kg	3	1.80

µg/kg = micrograms per kilogram.
mg/kg = milligrams per kilogram.
CCL = ratio of detected analyte concentration to analyte cleanup level.
Ingestion Screening Criteria from Illinois Pollution Control Board, "Tiered Approach to Corrective Action Objectives" (5 June 1997).

Table 10. Summary of Shallow Soil (i.e., Sediment) Samples Exceeding Tier 1 Screening Criteria - Ground-Water Ingestion Pathway

Sample ID	Sample Location	Date Sampled	Analyte	Detected Concentration	Units	Soil Component of Ground-Water Ingestion Exposure Route Class I Value	Class I CCL	Soil Component of Ground-Water Ingestion Exposure Route Class II Values	Class II CCL
MDSED1.2.5	Drainage Pathway	12/12/96	Carbazole	690 [1]	µg/kg	600 [1]	1.15	2,800 [1]	0.25
MDSED1.2.5		12/12/96	Cadmium (TCLP)	65.3 [2]	µg/l	5 [2]	13.06	50 [2]	1.306
MDSED1.2.5		12/12/96	Cadmium (total)	11.3 [3]	mg/kg	11 [3]	1.03	110 [3]	0.103
MDSED1.2.5		12/12/96	Manganese	477 [2] E	µg/l	150 [2]	3.18	10000 [2]	0.0477
MDSED2.0.8	Drainage Pathway	12/12/96	Benzo(a)anthracene	2,800 [1]	µg/kg	2,000 [1]	1.40	8,000 [1]	0.25
MDSED7.0.5	Little Vermilion River	12/12/96	Cadmium	11.3 [2]	µg/l	5 [2]	2.26	50 [2]	0.226
MDSED7.0.5		12/12/96	Chromium	40.1 [3]	mg/kg	28 [3]	1.43	No Data [3]	N/A
MDSED7.0.5		12/12/96	Manganese	1290 [2] E	µg/l	150 [2]	8.6	10000 [2]	0.129

[1] Organic concentrations in µg/kg are based on total analysis and standards are from Illinois Pollution Control Board, "Tiered Approach to Corrective Action Objectives" (5 June 1997), Section 742. Appendix B, Table B.

[2] Inorganic concentrations in µ
Objectives" (5 June 1997), Section 742. Appendix B, Table B.

[3] Inorganic concentrations in mg/kg are based on total analysis and standards are pH-specific, Illinois Pollution Control Board, "Tiered Approach to Corrective Action" Objectives" (5 June 1997), Section 742. Appendix B, Tables C and D.

mg/kg = milligrams per kilogram.
µg/kg = micrograms per kilogram.
µg/l = micrograms per liter.
CCL = ratio of detected analyte concentration to analyte cleanup level.
E = Estimated value due to matrix interference.

Table 11. Summary of Subsurface Soil Results Exceeding Tier 1 Screening Criteria for Industrial /Commercial Properties - Inhalation Pathway

Sample ID	Sample Location	Date Sampled	Analyte	Detected Concentration	Units	Inhalation Screening Criteria	CCL
MDSB1.0.5	Lowland Area	12/10/96	Arsenic	1,250	mg/kg	1,200	1.04
MDSB1.0.5		12/10/96	Manganese	102,000	mg/kg	91,000	1.12
MDSB3.0.5	Lowland Area	12/11/96	Manganese	126,000	mg/kg	91,000	1.38

mg/kg = milligrams per kilogram.
CCL = ratio of detected analyte concentration to analyte cleanup level.
Inhalation Screening Criteria from Illinois Pollution Control Board, "Tiered Approach to Corrective Action Objectives" (5 June 1997).

Table 12. Summary of Subsurface Soil Results Exceeding Tier 1 Screening Criteria for Industrial/Commercial Properties - Soil Ingestion Pathway

Sample ID	Sample Location	Date Sampled	Analyte	Detected Concentration	Units	Ingestion Screening Criteria	CCL
MDSB1.0.5	Lowland Area	12/10/96	Arsenic	1,250	mg/kg	3	417
MDSB1.0.5		12/10/96	Beryllium	2.8 B	mg/kg	1	2.80
MDSB1.0.5		12/10/96	Manganese	102,000	mg/kg	96,000	1.06
MDSB1.35	Lowland Area	12/10/96	Arsenic	17.8	mg/kg	3	5.93
MDSB1.35		12/10/96	Beryllium	1.3	mg/kg	1	1.30
MDSB2.0.5	Lowland Area	12/11/96	Arsenic	997	mg/kg	3	332
MDSB2.0.5		12/11/96	Beryllium	2.6 B	mg/kg	1	2.60
MDSB3.0.5	Lowland Area	12/11/96	Arsenic	799	mg/kg	3	266
MDSB3.0.5		12/11/96	Beryllium	1.8	mg/kg	1	1.80
MDSB3.0.5		12/11/96	Manganese	126,000	mg/kg	96,000	1.31
MDSB3.37	Lowland Area	12/11/96	Arsenic	40.1	mg/kg	3	13.37
MDSB4.0.5	Lowland Area	12/13/96	Arsenic	558	mg/kg	3	186
MDSB4.0.5		12/13/96	Beryllium	4	mg/kg	1	4.00
MDSB4.25	Lowland Area	12/13/96	Arsenic	146	mg/kg	3	48.67
MDSB4.25		12/13/96	Beryllium	2	mg/kg	1	2.00
MDSB5.11	Sweney G&O Co.	12/15/96	Arsenic	10.2	mg/kg	3	3.40

mg/kg = milligrams per kilogram.
CCL = ratio of detected analyte concentration to analyte cleanup level.
Ingestion Screening Criteria from Illinois Pollution Control Board, "Tiered Approach to Corrective Action Objectives" (5 June 1997).

Table 13. Summary of Subsurface Soil Results
Exceeding Tier 1 Screening Criteria for Industrial/Commercial Properties
Ground-Water Ingestion Pathway

Sample ID	Sample Location	Date Sampled	Analyte	Detected Concentration	Units	Soil Component of Ground-Water Ingestion Exposure Route Class I Values	Class I CCL	Soil Component of Ground-Water Ingestion Exposure Route Class II Values	Class II CCL
MDSB1.0.5	Lowland Area	12/10/96	Manganese	42300 [2] E	µg/l	150 [2]	282	10000 [2]	4.23
MDSB1.35	Lowland Area	12/10/96	Cadmium	6.7 [2]	µg/l	5 [2]	1.34	50 [2]	0.134
MDSB1.35		12/10/96	Manganese	6620 [2] E	µg/l	150 [2]	44.13	10000 [2]	0.662
MDSB4.0.5	Lowland Area	12/13/96	Lead	16.2 [2]	µg/l	7.5 [2]	2.16	100 [2]	0.162
MDSB4.0.5		12/13/96	Manganese	142000 [2] E	µg/l	150 [2]	946.67	10000 [2]	14.2
MDSB4.0.5		12/13/96	Nickel	174 [2]	µg/l	100 [2]	1.74	2000 [2]	0.087
MDSB4.0.5		12/13/96	Selenium (TCLP)	96.2 [2]	µg/l	50 [2]	1.92	50 [2]	1.924
MDSB4.0.5		12/13/96	Selenium (total)	39.5 [1]	mg/kg	3.3 [3]	11.97	3.3 [3]	11.97
MDSB4.25	Lowland Area	12/13/96	Cadmium	41.2 [2]	µg/l	5 [2]	8.24	50 [2]	0.824
MDSB4.25		12/13/96	Lead	15.1 [2]	µg/l	7.5 [2]	2.01	100 [2]	0.151
MDSB4.25		12/13/96	Manganese	122000 [2] E	µg/l	150 [2]	813.33	10000 [2]	12.2
MDSB4.25		12/13/96	Nickel	446 [2]	µg/l	100 [2]	4.46	2000 [2]	0.223
MDSB4.25		12/13/96	Selenium (TCLP)	77.6 [2]	µg/l	50 [2]	1.55	50 [2]	1.552
MDSB4.25		12/13/96	Selenium (total)	17.1 [3]	mg/kg	< 2.4 [3]	-	< 2.4 [3]	-
MDSB5.05	Sweney G&O Co	12/15/96	Carbon Tetrachloride	110 J [1]	µg/kg	70 [1]	1.57	330 [1]	0.33
MDSB5.05		12/15/96	Toluene	13,000 B [1]	µg/kg	12,000 [1]	1.08	29,000 [1]	0.45
MDSB5.05		12/15/96	Ethylbenzene	20,000 B [1]	µg/kg	13,000 [1]	1.54	19,000 [1]	1.05
MDSB5.11	Sweney G&O Co	12/15/96	1,2-Dichloroethane	31 [1]	µg/kg	20 [1]	1.55	100 [1]	0.31

[1] Organic concentrations in µg/kg are based on total analysis and standards are from Illinois Pollution Control Board, "Tiered Approach to Corrective Action Objectives" (5 June 1997), Section 742. Appendix B, Table B.

[2] Inorganic concentrations in µg/l are based on TCLP analysis. Class I and II ground-water standards from Illinois Pollution Control Board, "Tiered Approach to Corrective Action Objectives" (5 June 1997), Section 742. Appendix B, Table B.

[3] Inorganic concentrations in mg/kg are based on total analysis and standards are pH-specific, Illinois Pollution Control Board, "Tiered Approach to Corrective Action" Objectives" (5 June 1997), Section 742. Appendix B, Tables C and D.

mg/kg = milligrams per kilogram.
µg/kg = micrograms per kilogram.
µg/l = micrograms per liter.
CCL = ratio of detected analyte concentration to analyte cleanup level.
J, B = Qualified Data.
E = Estimated value due to matrix interference.

Table 14. Summary of Potential Constituents of Concern in Soil Using Tier 1 Screening Objectives, Class I Ground Water

	MEDIA								Total Number of Exceedances
	SHALLOW SOIL/SEDIMENT				SUBSURFACE SOIL				
			Soil Component/ Ground-Water Ingestion Route				Soil Component/ Ground-Water Ingestion Route		
CONSTITUENTS	Inhalation	Soil Ingestion	TCLP	Total	Inhalation	Soil Ingestion	TCLP	Total	
Inorganics									
Arsenic		8			1	8			17
Beryllium		6				6			12
Cadmium			2	1					1
Chromium	1			1			2		3
Manganese			2	NL	2	2	4	NL	10
Lead				NL			2	NL	2
Nickel							2		2
Selenium							2	2	2
Organics									
Benzo(a)anthracene			N/A	1			N/A		1
Benzo(a)pyrene		2	N/A				N/A		2
Carbazole			N/A	1			N/A		1
Carbon Tetrachloride			N/A				N/A	1	1
1,2-Dichloroethane			N/A				N/A	1	1
Ethylbenzene			N/A				N/A	1	1
Toluene			N/A				N/A	1	1

Number in table indicates constituent detected above Tier 1 Cleanup Objective.

* Per IAC Section 620.420(a)(2), manganese, nickel, and selenium standards do not apply to ground water within fill or within the upper 10 ft (3.1 m) of parent material under such fill material.

N/A indicates the methodology does not apply.

NL = Not Listed.

NOTE: TACO allows the option of comparing inorganic data to TCLP cleanup objectives listed in TACO, Section 742. Appendix B, Table B or applicable pH-specific cleanup objectives listed in TACO, Section 742. Appendix B, Tables C and D. Therefore, in calculating total number of exceedances, either the "TCLP" or "total" number of exceedances was included, not both.

Table 15. Summary of Potential Constituents of Concern in Soil Using Tier 1 Screening Objectives, Class II Ground Water

	MEDIA								Total Number of Exceedances
	SHALLOW SOIL/SEDIMENT				SUBSURFACE SOIL				
			Soil Component Ground-Water Ingestion Route				Soil Component/ Ground-Water Ingestion Route		
CONSTITUENTS	Inhalation	Soil Ingestion	TCLP	Total	Inhalation	Soil Ingestion	TCLP	Total	
Inorganics									
Arsenic		8			1	8			17
Beryllium		6				6			12
Cadmium			1	-					
Chromium	1		-	1					1
Manganese				NL	2	2	3	NL	7
Lead				NL				NL	
Nickel									
Selenium							2	2	2
Organics									
Benzo(a)anthracene			N/A				N/A		
Benzo(a)pyrene		2	N/A				N/A		2
Carbazole			N/A				N/A		
Carbon Tetrachloride			N/A				N/A		
1,2-Dichloroethane			N/A				N/A		
Ethylbenzene			N/A				N/A	1	1
Toluene			N/A				N/A		

Number in table indicates constituent detected above Tier 1 Cleanup Objective.

* Per IAC Section 620.420(a)(2), manganese, nickel, and selenium standards do not apply to ground water within fill or within the upper 10 ft (3.1 m) of parent material under such fill material.

N/A indicates the methodology does not apply.

NL = Not Listed.

NOTE: TACO allows the option of comparing inorganic data to TCLP cleanup objectives listed in TACO, Section 742. Appendix B, Table B or applicable pH-specific cleanup objectives listed in TACO, Section 742. Appendix B, Tables C and D. Therefore, in calculating total number of exceedances, either the "TCLP" or "total" number of exceedances was included, not both.

Table 16. Summary of Analytical Results Sediment Sample Duplicate
Phase III Investigation

Analyte	MDSED5.0.5	MDSED9.0.5	Units
Aluminum	13900	14600	mg/kg
Arsenic	23.8	29.2	mg/kg
Beryllium	1.1	1.2	mg/kg
Cadmium	4.1	3.7	mg/kg
Calcium	90000	57200	mg/kg
Chromium	30.3	28.3	mg/kg
Cobalt	10.3	11.7	mg/kg
Copper	38	28.4	mg/kg
Iron	27800	30700	mg/kg
Magnesium	44400	17300	mg/kg
Manganese	2210	2740	mg/kg
Mercury	0.1	0.03 B	mg/kg
Nickel	30.6	32	mg/kg
Potassium	5900	5050	mg/kg
Selenium	1.5	2.4	mg/kg
Sulfate as SO4	524	511	mg/kg
Zinc	324	329	mg/kg

mg/kg = milligrams per kilogram.
B = Analyte also present in associated blank sample.

Table 17. Summary of Analytical Results Soil Sample Duplicate Phase III Investigation

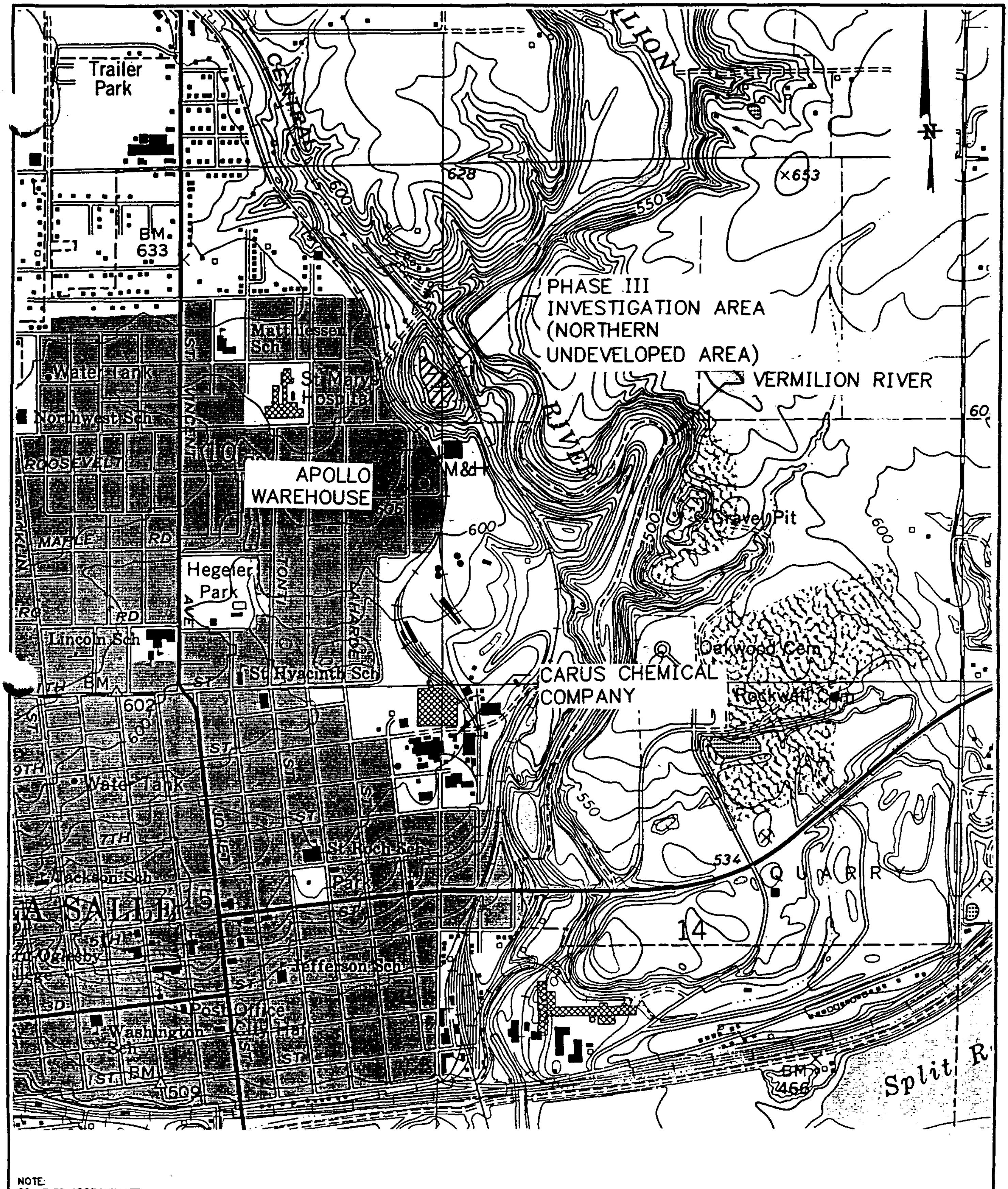
Analyte	MDSB4.25	MDSB6.25	Units
Aluminum	24,100.00	17,300.00	mg/kg
Arsenic	146.00	836.00	mg/kg
Beryllium	2.00	4.20	mg/kg
Cadmium	7.70	5.80	mg/kg
Calcium	53,400.00	126,000.00	mg/kg
Carbon disulfide	17.00	27 U	mg/kg
Chromium	349.00	185.00	mg/kg
Cobalt	40.60	146.00	mg/kg
Copper	417.00	257.00	mg/kg
Cyanide	0.85 U	3.30	mg/kg
Iron	52,300.00	127,000.00	mg/kg
Magnesium	12,100.00	3,230.00	mg/kg
Manganese	22,300.00	128,000.00	mg/kg
Mercury	0.18	0.44	mg/kg
Nickel	429.00	453.00	mg/kg
Potassium	11,200.00	2,580.00	mg/kg
Selenium	17.10	84.90	mg/kg
Silver	1 B	4.50	mg/kg
Sodium	466.00	237 B	mg/kg
Sulfate as SO4	50,000.00	79,100.00	mg/kg
Tin	11.20	10.5 B	mg/kg
Zinc	1,720.00	237.00	mg/kg
Acetone	220.00	23 J	ug/kg

mg/kg = milligrams per kilogram.
ug/l = micrograms per liter.
U = Not Detected .
B = Analyte also present in associated blank sample.
J = Estimated value.

Table 18. Summary of Analytical Results of Equipment Blanks and Travel Blanks
Phase III Investigation

Sample Identification	Analyte Detected	Date Sampled	Analytical Result	Units	Result Qualifier	Dilution	MDL
Equipment Blank							
MDEB1SED	Di-n-butylphthalate	12/13/96	0.34	ug/l	BJ	1	330
MDEB1SED	Aluminum	12/13/96	18.4	ug/l	B	0	7
MDEB1SED	Barium	12/13/96	0.21	ug/l	B	0	0.012
MDEB1SED	Calcium	12/13/96	37.9	ug/l	B	0	3.8
MDEB1SED	Iron	12/13/96	2.3	ug/l	B	0	1.6
MDEB1SED	Manganese	12/13/96	0.36	ug/l	B	0	0.013
MDEB1SED	Sodium	12/13/96	234	ug/l	B	0	180
MDEB1SED	Zinc	12/13/96	2.4	ug/l	B	0	1.1
MDEB26W1	Di-n-butylphthalate	12/16/96	0.37	ug/l	BJ	1	330
MDEB26W1	Aluminum	12/16/96	11.3	ug/l	B	0	7
MDEB26W1	Calcium	12/16/96	41.8	ug/l	B	0	3.8
MDEB26W1	Manganese	12/16/96	0.6	ug/l	B	0	0.013
MDEB26W1	Nickel	12/16/96	1.4	ug/l	B	0	0.8
MDEB26W1	Sodium	12/16/96	234	ug/l	B	0	180
MDEB26W1	Zinc	12/16/96	2.6	ug/l	B	0	1.1
MDEB26W1	Acetone	12/16/96	6	ug/l	BJ	1	10
Travel Blank							
TB2 CB591	Acetone	12/10/96	8	ug/l	BJ	1	10
TB2 CB591	Benzene	12/10/96	0.5	ug/l	J	1	10
TB2 CB591	1,1,2,2-Tetrachloroethane	12/10/96	0.5	ug/l	J	1	10

ug/l = micrograms per liter.
B = Analyte also present in associated blank sample.
J = Estimated value.
MDL = Method Detection Limit.



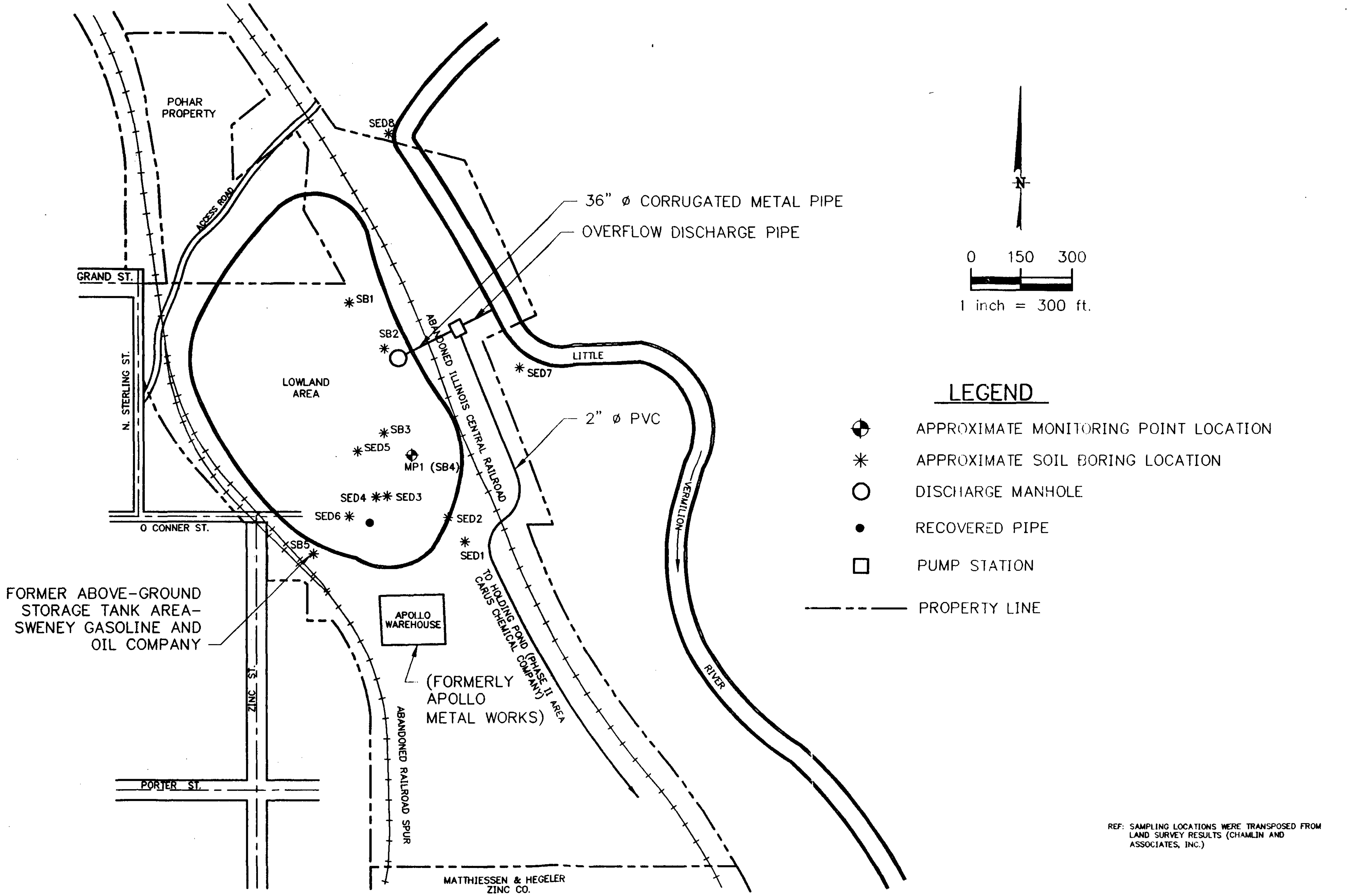
NOTE:
SCALE IS APPROXIMATE

IRCE: USGS, 1968
SALLE QUADRANGLE
15 MINUTE SERIES

LOCATION MAP, PHASE III INVESTIGATION AREA

GEOSYNTEC CONSULTANTS	FIGURE NO. 1
	PROJECT NO. FR0042

0042F001 199706031138R0

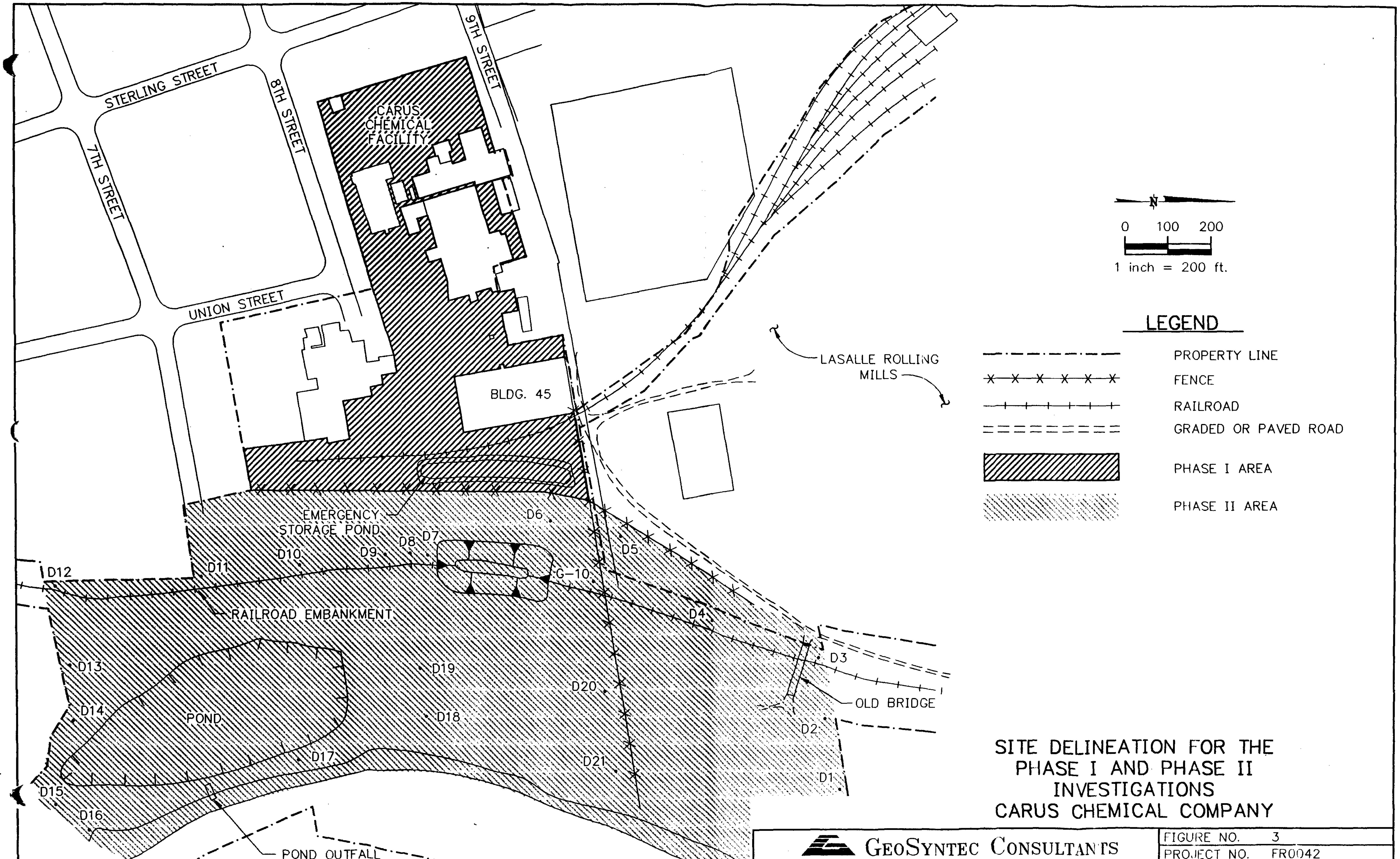


NORTHERN UNDEVELOPED AREA INVESTIGATION MAP

GEOSYNTEC CONSULTANTS

FIGURE NO.	2
PROJECT NO.	FR0042

0042F001 199706031138RO

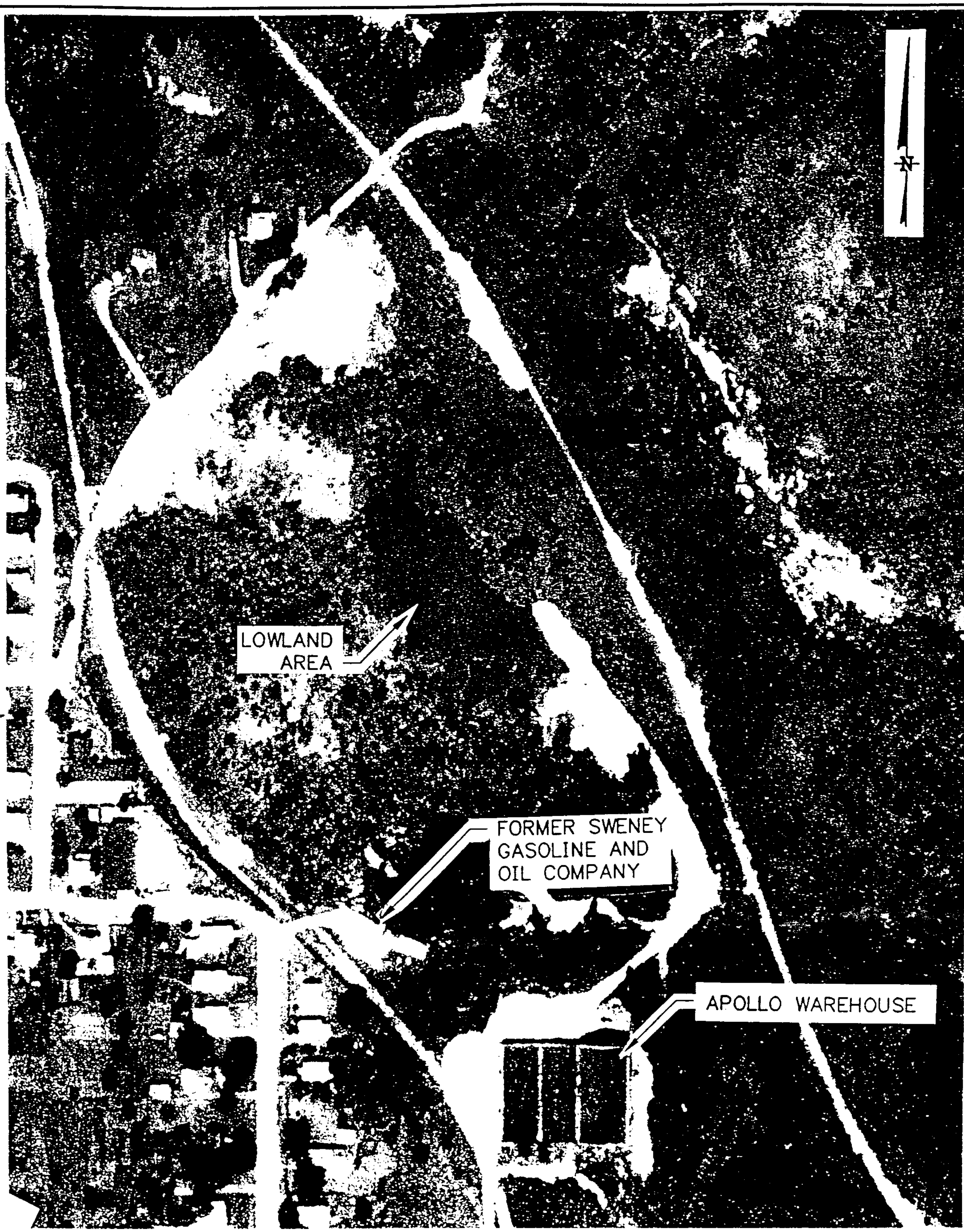


SITE DELINEATION FOR THE PHASE I AND PHASE II INVESTIGATIONS
CARUS CHEMICAL COMPANY

GEOSYNTEC CONSULTANTS

FIGURE NO.	3
PROJECT NO.	FR0042

0042F006 199706031132RO



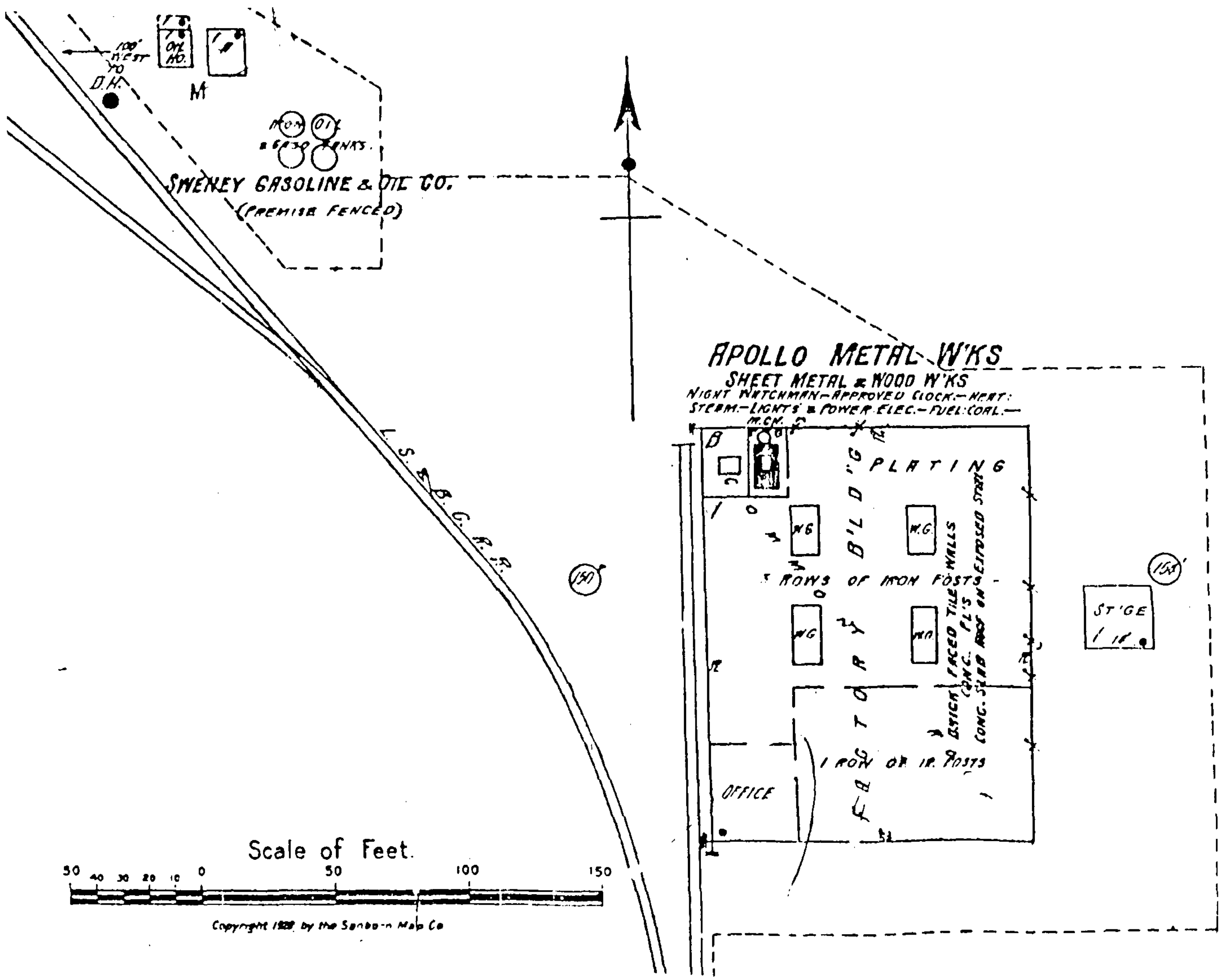
1970 AERIAL PHOTOGRAPH, PHASE III INVESTIGATION AREA

RCE:
JS CHEMICAL

GEOSYNTEC CONSULTANTS

FIGURE NO.	4
PROJECT NO.	FR0042

0042F001 199706031138R0

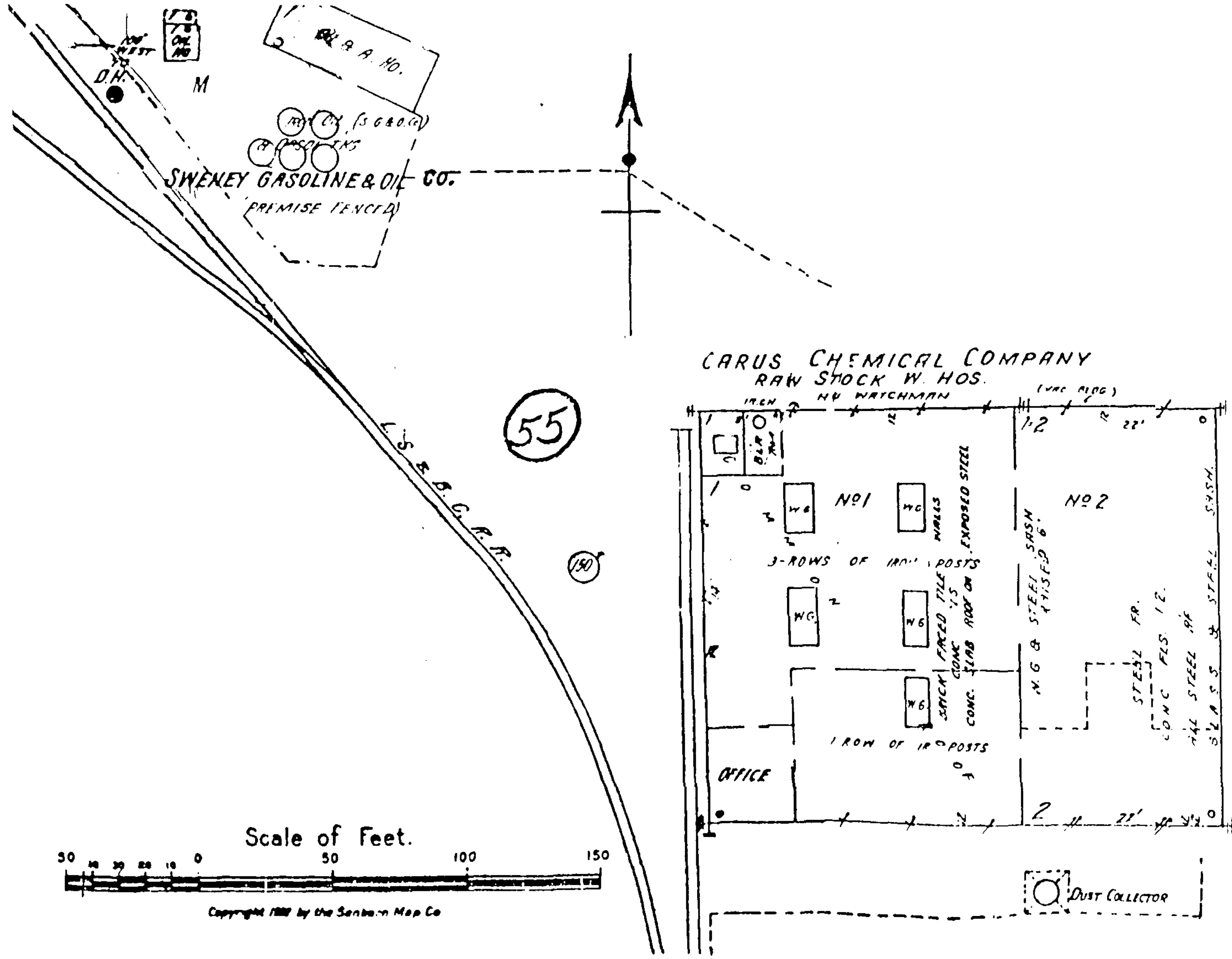


SANBORNE MAP FOR 1926

GEOSYNTEC CONSULTANTS

FIGURE NO.	5
PROJECT NO.	FR0042

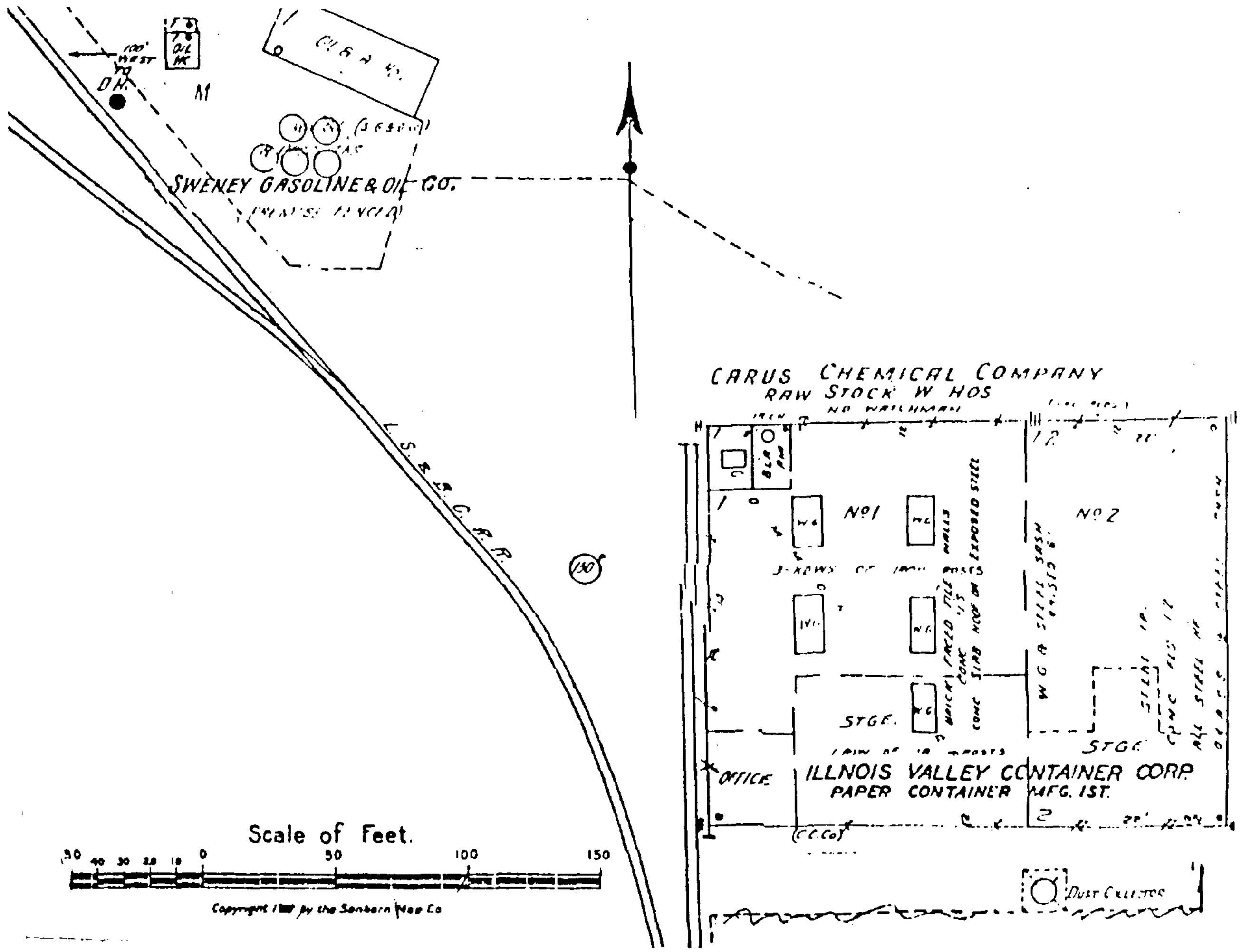
0042F005 199706031055RO



SANBORNE MAP FOR 1949

GEOSYNTEC CONSULTANTS

FIGURE NO.	6
PROJECT NO.	FR0042

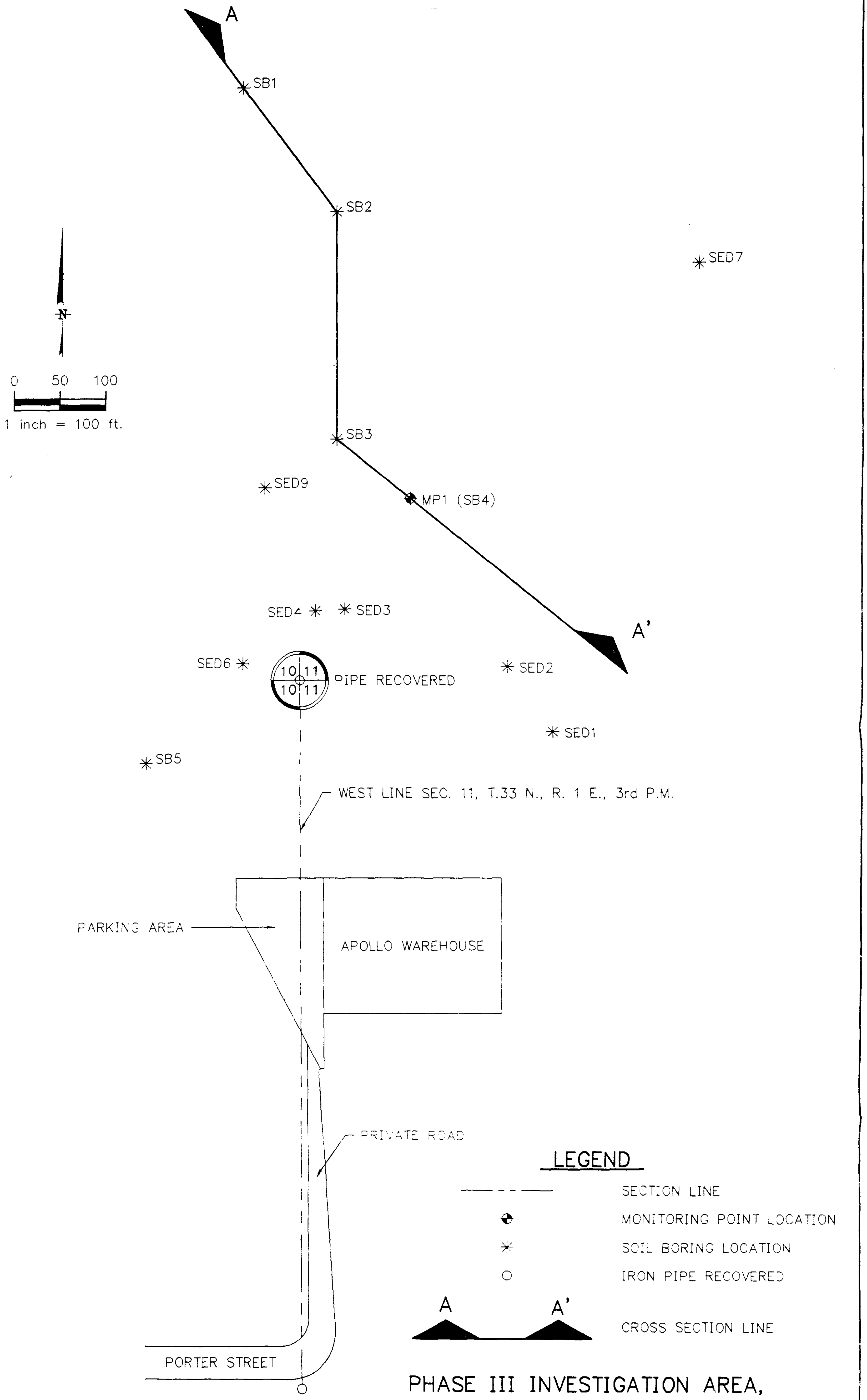


SANBORNE MAP FOR 1960

GEOSYNTEC CONSULTANTS

FIGURE NO.	7
PROJECT NO.	FR0042

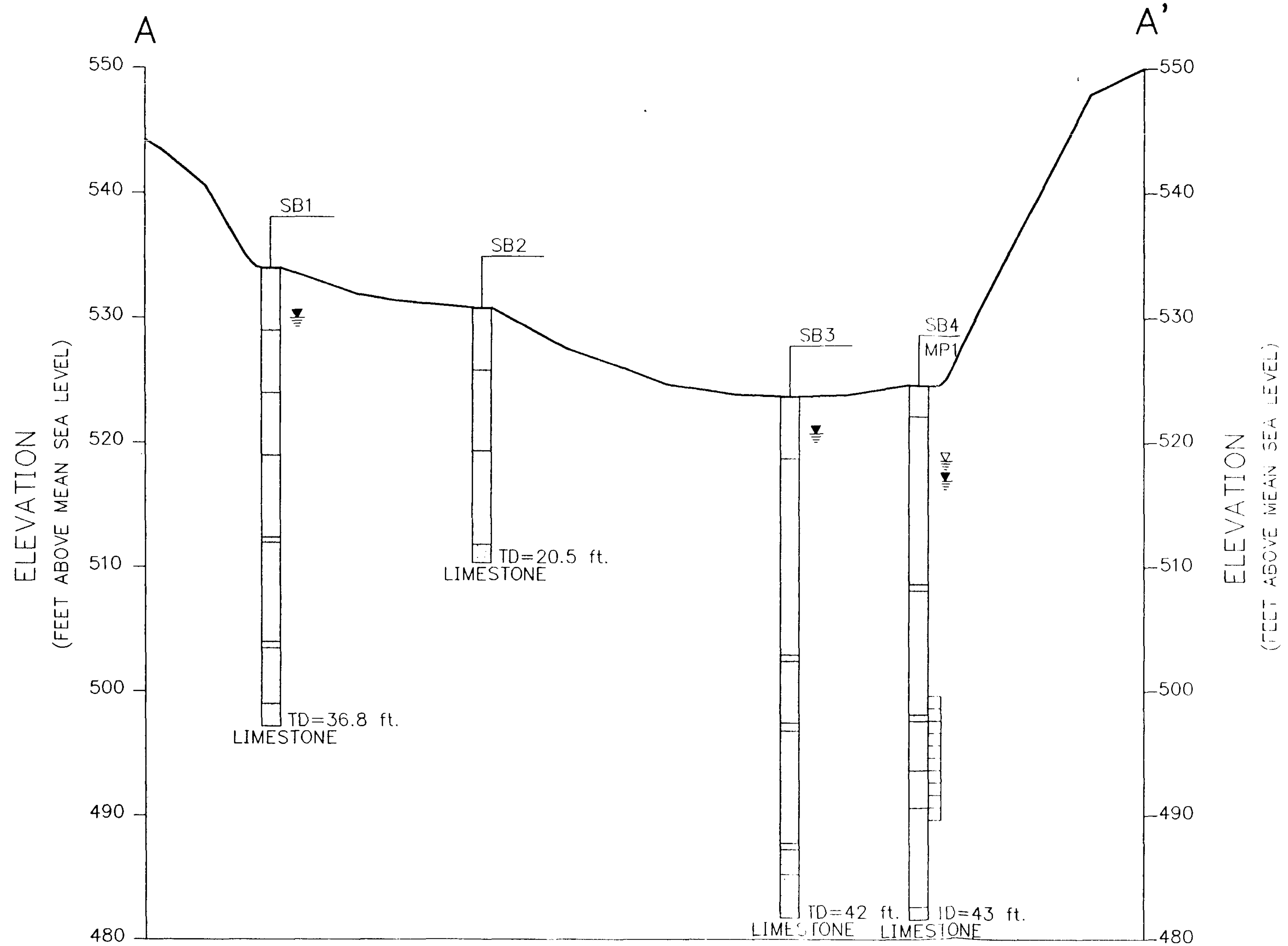
0042F005 199706031055RO



PHASE III INVESTIGATION AREA,
CROSS SECTION LOCATION MAP

GeoSyntec Consultants	FIGURE NO. 8
	PROJECT NO. FR0042

042FC03 19970603105BRO



HORIZONTAL SCALE

0 50 100

1 inch = 100 ft.

VERTICAL SCALE

0 5 10

1 inch = 10 ft.

LEGEND

- GRAVELY SAND-CLAY
- GRAVELY SAND/ WEATHERED LIMESTONE (RIVER CHANNEL MATERIAL)
- CLAY
- SILTY CLAY
- GELATINOUS MATERIAL
- WATER ENCOUNTERED DURING DRILLHOLE ADVANCEMENT
- MEASURED WATER ELEVATION
- SB1- SOIL BORING ELEVATION
- MP1- SCREENED PORTION OF MONITORING POINT INSTALLED IN SOIL BORING SB4
- TD TOTAL BOREHOLE DEPTH IN FEET

GENERALIZED LITHOLOGIC CROSS SECTION, PHASE III AREA

GEOSYNTEC CONSULTANTS

FIGURE NO. 9

PROJECT NO. FR0042

0042F002 199706031136R0

APPENDIX A

LITHOLOGIC BORING LOGS

AND WELL COMPLETION REPORTS

APPENDIX A-1

LITHOLOGIC BORING LOGS

GeoSyntec Consultants

BORING LOG

Borehole Location Sketch Map

Identification: MDSB1 Page 1 of 1

Site: Muddies Phase III / CARUS Project No.: FR0042

Status: Backfilled w/ bentonite-grout slurry Drilled: 12-10-96

Tools & Method: Hollow Stem Auger Bit Diameter: 8 1/2 in

Total Depth: 36.8 Ground Elevation: [illegible] Surveyor: [illegible]

Drilling Company: Layne Northwest Rig: CME 850

Supervisor: Mayra Castellanos Reviewer: Driller: Mark Backhaus

Elev. (feet)	Top (feet)	Lithology Log	USCS Log	Well	Depth Scale (feet)	Std.Pen. Blows	Std.Pen. Run	Test Rec.	Drilling Log
		CLAY - reddish-brown, soft, some indurated clay chips, dry.	CL			2 5 7 4		12	SAMPLE 0.5 to 2.0 ft MDSB1.0.5 chem. OVA < 1 ppm
		Saturated at 4.5'							
	5	SILTY CLAY - reddish-brown and grayish black, thinly laminated, dry.	ML		5	3 2 2 2		4	SAMPLE 5-7 ft OVA <1 ppm Water inside augers
	10	CLAY - soft, saturated, reddish-brown, silver gray to black fragments interspersed in clay matrix, a white crystalline patch noted at 12 ft depth	CL		10	7 4 3 4		7	SAMPLE 10-12 ft
	15	Unconsolidated reddish-brown gelatinous material.			15	1 1 1 2		2	Sample 15-17 ft
	21.6	SILTY CLAY - light bluish gray, soft saturated.	ML		20	1 3 4 5		7	SAMPLE 20-22 ft
	22	Thin 1/8-in. layer of dark gray CLAY alternating with gelatinous reddish-brown material.	CL						
	25	Unconsolidated gelatinous material			25	1 1 1 2		2	SAMPLE 25-27 ft
	30	Limestone GRAVEL intermixed with a trace of SILTY CLAY	CL		30	15 24 36 24		60	SAMPLE 30-32 ft
	30.5	Reddish-brown gelatinous material							
	35	Silty CLAY - hard, light olive gray, moderately plastic	ML		35	10 25 40 65		65	SAMPLE 35-37 ft MDSB1.35 chem.
	36.8	Limestone - reacts with hydrochloric acid - auger refusal	LS						

GeoSyntec Consultants

BORING LOG

Borehole Location Sketch Map

Identification: MD SB2 | Page 1 of 1

Site: Muddies Phase III / CARUS | Project No.: FR0042

Status: BACKFILLED with Bentonite Grout | Drilled: 12-11-96

Tools & Method: Hollow Stem Auger | Bit Diameter:

Total Depth: 20.5 ft | Ground Elevation: 5[illegible] | Surveyor: [illegible]

Drilling Company: LAYNE NORTHWEST | Rig: CME 850

Supervisor: Mayra Castellanos | Reviewer: | Driller: Mark Backhaus

Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std.Pen. Blows	Run	Test Rec.	Drilling Log
		SILTY CLAY - moderate reddish brown, soft, non plastic, slightly bedded alternating w/ thin gray bands less 1/16 in, tree roots abundant, some oxide staining present, some slightly indurated zones, dry.	ML		0	1/2 1/2 1/2 1/2		1	SAMPLE 0.5 to 2.5 ft MDSB2.0.5 OVA <1ppm
	5'	Slight increase in moisture			5	1 1 2 2		3	SAMPLE 5-7' OVA <1ppm
	10'	Gelatinous reddish-brown material soft and wet			10	1 1 7 4		8	SAMPLE 10-12' Saturated material @10ft
	11.6'	CLAY - light olive gray to yellowish brown, reworked, some orange brown patches noted possibly fill.	CL						
	16.8'	CLAY - light olive blue, mottled, moderately plastic, reworked, some gray-black coatings noted on clay fragments, trace of silt, possibly fill.	CL		15	6 7 8 11		15	SAMPLE 15-17 ft
	19.5	increase in silt content, sparse limestone gravel present, possible channel material	GP		20	50			SAMPLE 20-22 ft refusal at 20.5 ft Total Depth 20.5'
	20.5	- limestone - refusal bedrock							
					25				
					30				
					35				

GEOSYNTEC CONSULTANTS

BORING LOG

Borehole Location Sketch Map

Identification: MD SB3 Page 1 of 2

Site: Muddies - Phase III / CARUS Project No.: FR0042

Status: Back filled Drilled: 12-11-96

Tools & Method: Hollow Stem auger Bit Diameter: 8½ in

Total Depth: 42 Ground Elevation: ≈23.74 Surveyor: [illegible]

Drilling Company: Layne Christensen Rig: CME 850

Supervisor: Mayra Castellanos Reviewer: Driller: Mark Backhaus

Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std.Pen. Blows	Run	Test Rec.	Drilling Log
		CLAY - reddish brown with silt, slight beaded, lt reddish brown to lt brownish gray				1/4 1/4 1/4 1/4		1	SAMPLE 0.5-2.5 OVA <1ppm MDSB3.0.5
	5'	Gelatinous waste material - reddish brown alternating with dark brown material			5			1	SAMPLE 5-7' OVA <1ppm
	10'	Gelatinous material/reddish-brown - moist			10			1	SAMPLE 10-12' OVA <1ppm
	15	SATURATED conditions Gelatinous dark brown material			15	1/4 1/2 1/2		1	SAMPLE 15-17' SATURATED conditions
	20.8	1 in thick yellowish-brown clay lense, separating gelatinous material			20			1	SAMPLE 20 to 22'
	26.3	clayey lense - greenish gray within gelatinous material as above			25			1	SAMPLE 25-27' Raining
					30			1	SAMPLE 30-32'
	36.6-37	GRAVELLY CLAY lt olive brown with limestone gravel	CL		35	4 11 12 12		23	SAMPLE 35-37'
	37	CLAYEY GRAVEL - 1 in gravels w/ some clay and sand	GC			6 7 16 10		23	SAMPLE 37-39 STOP 12-11
	38.8	CLAY - moderately plastic, gray	CL						resume 12-12

Identification: MD SB3 Site:. Muddies Phase III Proj. No.: FR0042 Page 2 of 2

Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale	Std.Pen. Blows	Std.Pen. Run	Test Rec.	Drilling Log
	40	GRAVELLY SAND with clay of medium plasticity, poorly graded, gravel consists of weathered limestone subangular limestone yellowish brown reacts vigorously with HCl	SP			13 16 19 ~~45~~		35	SAMPLE 40-42 ft MDSB3.40 Refusal at 42 ft
	42'								
					45				
					50				
					55				
					60				
					65				
					70				
					75				
					80				
					85				

GeoSyntec Consultants

BORING LOG

Borehole Location Sketch Map

ntification: MDSB4 / MDMP1 Page 1 of 2
Site: Mullies Phase III / Carus Project No.: FR0042

Status: Completed as Monitoring Point -1 (MP-1) Drilled: 12-13-96
Tools & Method: Hollow Stem auger Bit Diameter: 8½ in
Total Depth: Ground Elevation: [illegible] Surveyor: Chamlin & Associates, Inc
Drilling Company: LAYNE CHRISTIANSEN Rig: CME 850
Supervisor: MAYRA CASTELLANOS Reviewer: Driller: Bob Jordan

Elev. (feet)	Top (feet)	Lithology Log	USCS Log	Well	Depth Scale (feet)	Std.Pen. Blows	Run	Test Rec.	Drilling Log
		CLAY - lt brown, moist, of high plasticity	CL			1 2 3 3		5	MDSB4.0.5 OVA <1ppm
	2'	CLAY - dark brown, oxide stains present, increase in moisture				1 2 2 1		4	MDSB6.2.5 duplicate OVA <2ppm
	2.5	Gelatinous material - saturated							
		Gelatinous material - reddish brown, very soft			5	1 ½ ½ ½		1	SATURATED CONDITIONS
					10	1 2 ½ ½		2.5	
					15	½ ½ ½ ½		1	
	16.3'	a thin vein of gray clay forming a parting plane across gelatinous material, 1/16 in thick							
	16.8'	a thin band of clay 1/8 in thick							
		Gelatinous Material			20	¼ ¼ ¼ ¼		½	Picture of clay seam taken by CPAs Bob Casper
	21.4'	thin clay seam 1/16 in thick							
		Gelatinous Material			25	4 8 14 36		22	
	26.5	CLAY - moderate yellowish brown to olive brown, mod plasticity, with trace of gravels							
	27'	Large cobble sampler refusal							
	28'	Back into gelatinous material							
	30.5	SILTY CLAY - reddish brown, high plasticity, sparse coal fragments, saturated, stiff.	ML		30	5 5 11 14		16	STOP 12-13-96 Restart 12-14-96
	35	Gravelly Clay - multicolored sparse gravel content, fragments of coal present, moderately stiff, grayish-yellow brown, mottled.	CL		35	4 7 10		17	

Identification: MDSB4/MDMP1 Site: Muddies Ph III CARUS Proj. No.: FR0042 Page 2 of 2

Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale	Std.Pen. Blows	Run	Test Rec.	Drilling Log
		CLAY with gravel - olive gray mottled with orange brown, stiff, multicolored, subangular gravel, coal chips present.	Ch			6 7 8 11		15	
	43	Limestone bedrock - limestone fragments	Ls		45	50 refusal			auger refusal at 43 ft
					50				Borehole backfilled to 38 ft below grade with bentonite chips 3/8 in SAND 38-36 ft depth screen 35-25 ft top of gravel pack Red Flint #30 to 23 ft 1 ft of fine 60 22 ft Bentonite to 20 ft grout 0-20 ft above ground completion
					55				
					60				
					65				
					70				
					75				
					80				
					85				

GEOSYNTEC CONSULTANTS

BORING LOG

Borehole Location Sketch Map

Identification: MD SB5 Page 1 of 1

Site: Muddies Phase III / Caevs Project No.: FR0048

Status: Backfilled with bentonite grout Drilled:

Tools & Method: Hollow Stem Auger Bit Diameter: 8½ in

Total Depth: Ground Elevation: 654.65 Surveyor: Chamlin & Associates, Inc

Drilling Company: LAYNE CHRISTIANSEN Rig: CME 850

Supervisor: Maura Castellanos Reviewer: Driller: Bob Jorden

Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std.Pen. Blows	Run	Test Rec.	Drilling Log
		SILTY CLAY - yellowish brown with sparse gravel, stiff, dry	ML			9 9 13 11		22	MDSB5.0.5 Chem. Strong petroleum odor 0.5 OVA 1,000 ppm 1ppm w/filter
		GRAVELLY CLAY, moist - moderate yellowish brown, sparse gravels, moderately plastic clay,	CL		5	5 10 12 24		22	MD SB5.5 hole OVA 900ppm <1ppm filter Petroleum odor
		SILTY CLAY - moderate yellowish brown, with, very sparse gravel subangular, 1-2" moderately stiff. dry	ML		10	7 12 12 17		24	OVA <1ppm MDSB5.11 Chem no petroleum odor
		CLAY - lt olive gray, dry stiff, very plastic	CH		15	6 9 9 15		18	OVA <2.5ppm OVA inside hole 100ppm No odor total borehole depth 15 ft sample hole to 17 ft
					20				
					25				
					30				
					35				

APPENDIX A-2

MONITORING WELL MP1 CONSTRUCTION LOG

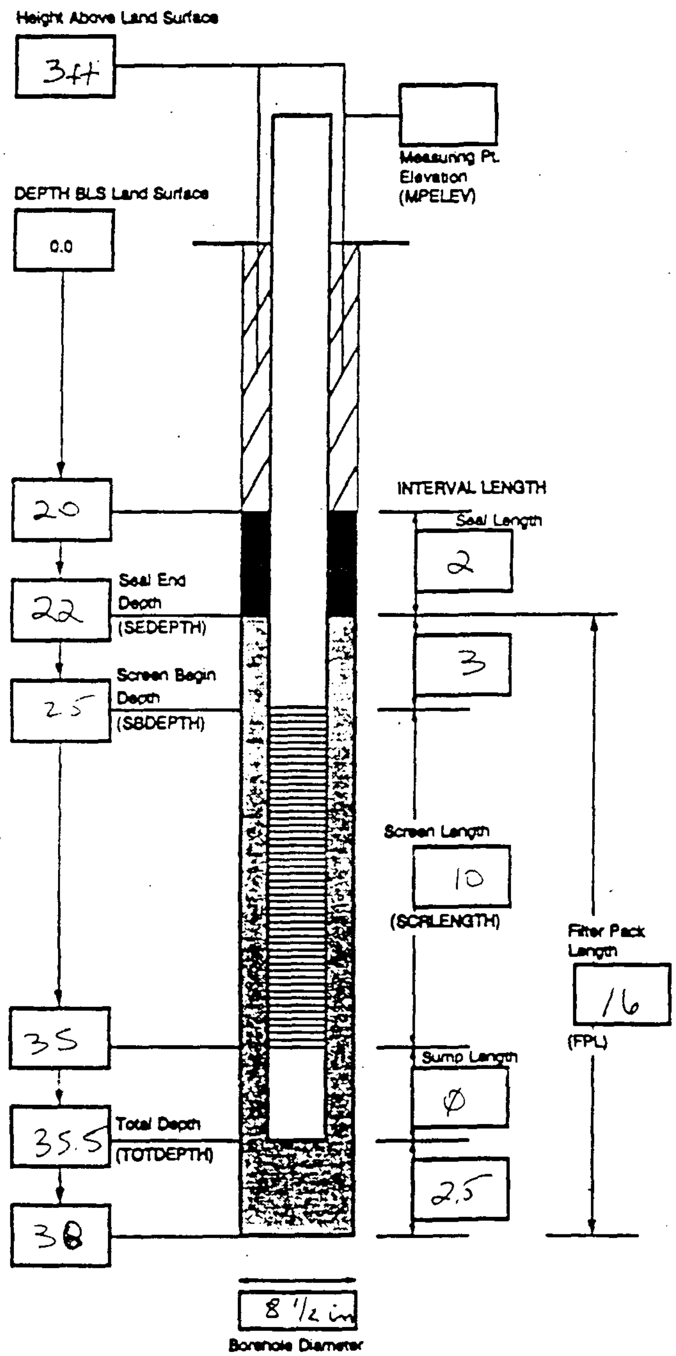
PROJECT #

FORM C
Fieldbook_____

WELL CONSTRUCTION LOG
ABOVE GROUND COMPLETION

Installation(AFIID): Monitoring Point
Well I.D.(LOCID): MD MP-1
Drilling Company: LAYNE Christiansen
Drillers: Bob Jordan
Geologist/Engineer: M. Castellanos
Signature: Magna Castellanos

Site: CAFUS - Muddies Phase III Area
Installation Method: Hollow Stem Auger
Casing Installation Date (INSDATE):
Well Type (WTCCODE): Monitoring
Well Completion Method (WCMCODE): Above ground
Geologic Completion Zone (GZCCODE):



Well Completion
Guard Posts (Y / N) Date: 2-15-96
Surface Pad Size: 2 ft x 2 ft

Protective Casing or Cover
Diameter/Type: 5 in Pearl
Depth BGS: 3 Weep Hole (Y / N)

Grout
Composition/Proportions: TYPE I CEMENT PORTLAND WITH 3% Bentonite
Placement Method: teemmie

Seal Date: 2-14-96
Type: Bentonite chips
Source: Pure Gold
Set-up/Hydration Time: 1 hr
Placement Method: free Fall
Vol. Fluid Added: 8 gal

Filter Pack
Type: Red Flint #30
Source: #30 Red Flint / #40
Amount Used: #30 550 lbs / #40 20 lbs
Placement Method: Free Fall

Well Riser Pipe
Casing Material (CMACODE): PVC schedule 40
Casing Inside Diameters (CASDIAM): 2.067 in

Screen
Material: Schedule 40 PVC
Inside Diameter (SCRDIAM): 2.067 in
Screen Slot Size (SOUA): .010 in
Percent Open Area (PCTOPEN): —
Sump or Bottom Cap (Y / N) threaded bottom cap
Type/Length: threaded PVC - 6 in
Backfill Plug (Y / N)
Material: Bentonite chips 3/8
Placement Method: Pour
Set-up/Hydration Time: 8 hrs

Total Water Volume During Construction
Introduced (Gal): 7 Recovered (Gal): —

Reviewed
By:__________ Date:__________ ~~Page of~~

Comments
Above ground completion.

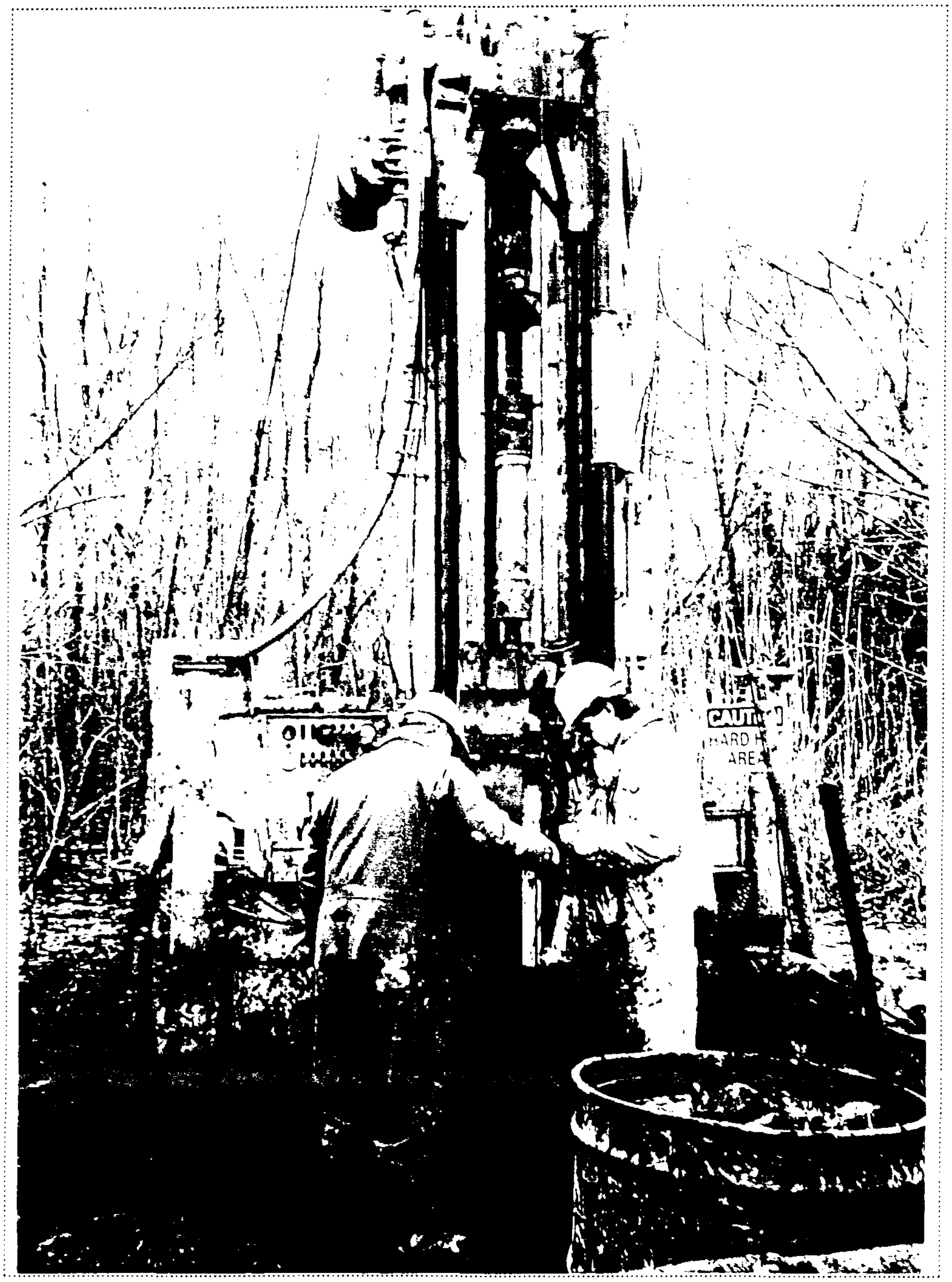
APPENDIX A-3

PHOTOGRAPHIC DOCUMENTATION

Close up view of semi-solid waste fill material encountered in the lowland area.

Location of soil boring SB-3, within lowland area.

Soil Boring (SB-5) advanced at the former Sweney Gasoline and Oil Company.



Completion of monitoring well MP1 in the lowland area.

APPENDIX B

SUMMARY OF

ANALYTICAL RESULTS

APPENDIX B-1

SHALLOW SOIL SAMPLES

Appendix B-1. Analytes Present in Shallow Soil/Sediment Samples
Phase III Investigation

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSED1.2.5	12/12/96	Aluminum	18600		1	mg/kg dw
MDSED1.2.5	12/12/96	Antimony	0.96	UN	0.96	mg/kg dw
MDSED1.2.5	12/12/96	Arsenic	14.5		0.56	mg/kg dw
MDSED1.2.5	12/12/96	Barium	179	N*	0.018	mg/kg dw
MDSED1.2.5	12/12/96	Beryllium	1.5		0.041	mg/kg dw
MDSED1.2.5	12/12/96	Cadmium	11.3		0.06	mg/kg dw
MDSED1.2.5	12/12/96	Calcium	85400		0.58	mg/kg dw
MDSED1.2.5	12/12/96	Chromium	48.6		0.091	mg/kg dw
MDSED1.2.5	12/12/96	Cobalt	12.5		0.14	mg/kg dw
MDSED1.2.5	12/12/96	Copper	131		0.11	mg/kg dw
MDSED1.2.5	12/12/96	Iron	35200		0.23	mg/kg dw
MDSED1.2.5	12/12/96	Lead	83.5	*	0.24	mg/kg dw
MDSED1.2.5	12/12/96	Magnesium	45700		0.98	mg/kg dw
MDSED1.2.5	12/12/96	Manganese	1800		0.02	mg/kg dw
MDSED1.2.5	12/12/96	Mercury	0.09		0.014	mg/kg dw
MDSED1.2.5	12/12/96	Nickel	218		0.11	mg/kg dw
MDSED1.2.5	12/12/96	Potassium	7550		7	mg/kg dw
MDSED1.2.5	12/12/96	Selenium	1.8		0.46	mg/kg dw
MDSED1.2.5	12/12/96	Silver	0.51	B	0.086	mg/kg dw
MDSED1.2.5	12/12/96	Sodium	319	B	26	mg/kg dw
MDSED1.2.5	12/12/96	Sulfate as SO4	152		140	mg/kg dw
MDSED1.2.5	12/12/96	Thallium	3.4	BN	0.54	mg/kg dw
MDSED1.2.5	12/12/96	Tin	54.6		0.34	mg/kg dw
MDSED1.2.5	12/12/96	Vanadium	50.2	N	0.091	mg/kg dw
MDSED1.2.5	12/12/96	Zinc	1180		0.16	mg/kg dw
MDSED1.2.5	12/12/96	2-Methylnaphthalene	66	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	2-Methylnaphthalene	81	J	490	ug/kg dw
MDSED1.2.5	12/12/96	Acenaphthene	480	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Acenaphthene	400	J	490	ug/kg dw
MDSED1.2.5	12/12/96	Acenaphthylene	140	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Anthracene	640	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Anthracene	510		490	ug/kg dw
MDSED1.2.5	12/12/96	Benzo(a)anthracene	1800	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Benzo(a)anthracene	1600		490	ug/kg dw
MDSED1.2.5	12/12/96	Benzo(a)pyrene	1100		490	ug/kg dw
MDSED1.2.5	12/12/96	Benzo(a)pyrene	1300	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Benzo(b)fluoranthene	1900	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Benzo(b)fluoranthene	1700		490	ug/kg dw
MDSED1.2.5	12/12/96	Benzo(g,h,i)perylene	570		490	ug/kg dw
MDSED1.2.5	12/12/96	Benzo(g,h,i)perylene	680	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Benzo(k)fluoranthene	820	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Benzo(k)fluoranthene	610		490	ug/kg dw
MDSED1.2.5	12/12/96	bis(2-Ethylhexyl)phthalate	17	J	490	ug/kg dw
MDSED1.2.5	12/12/96	Carbazole	780	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Carbazole	690		490	ug/kg dw
MDSED1.2.5	12/12/96	Chloroform	0.8	J	14	ug/kg dw
MDSED1.2.5	12/12/96	Chrysene	2200	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Chrysene	1700		490	ug/kg dw
MDSED1.2.5	12/12/96	Di-n-butylphthalate	15	J	490	ug/kg dw
MDSED1.2.5	12/12/96	Di-n-octylphthalate	19	J	490	ug/kg dw
MDSED1.2.5	12/12/96	Dibenzo(a,h)anthracene	210	J	490	ug/kg dw
MDSED1.2.5	12/12/96	Dibenzo(a,h)anthracene	150	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Dibenzofuran	350	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Dibenzofuran	320	J	490	ug/kg dw
MDSED1.2.5	12/12/96	Fluoranthene	5500	D	2400	ug/kg dw
MDSED1.2.5	12/12/96	Fluoranthene	4300	E	490	ug/kg dw
MDSED1.2.5	12/12/96	Fluorene	640	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Fluorene	590		490	ug/kg dw
MDSED1.2.5	12/12/96	Heptachlor	1.8	JP	2.6	ug/kg dw
MDSED1.2.5	12/12/96	Indeno(1,2,3-cd)pyrene	700		490	ug/kg dw
MDSED1.2.5	12/12/96	Indeno(1,2,3-cd)pyrene	650	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Naphthalene	170	J	490	ug/kg dw
MDSED1.2.5	12/12/96	Naphthalene	190	DJ	2400	ug/kg dw
MDSED1.2.5	12/12/96	Phenanthrene	5200	D	2400	ug/kg dw
MDSED1.2.5	12/12/96	Phenanthrene	4000	E	490	ug/kg dw
MDSED1.2.5	12/12/96	Pyrene	4100	D	2400	ug/kg dw
MDSED1.2.5	12/12/96	Pyrene	3600		490	ug/kg dw
MDSED1.2.5	12/12/96	Toluene	5	BJ	14	ug/kg dw
MDSED1.2.5	12/12/96	Xylenes	3	J	14	ug/kg dw

Appendix B-1. Analytes Present in Shallow Soil/Sediment Samples
Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSED2.0.8	12/12/96	Aluminum	17500		0.96	mg/kg dw
DSED2.0.8	12/12/96	Antimony	8.3	BN	0.68	mg/kg dw
DSED2.0.8	12/12/96	Arsenic	18.6		0.52	mg/kg dw
MDSED2.0.8	12/12/96	Barium	117	N*	0.016	mg/kg dw
MDSED2.0.8	12/12/96	Beryllium	1.8		0.038	mg/kg dw
MDSED2.0.8	12/12/96	Cadmium	34.4		0.056	mg/kg dw
MDSED2.0.8	12/12/96	Calcium	48800		0.54	mg/kg dw
MDSED2.0.8	12/12/96	Chromium	440		0.084	mg/kg dw
MDSED2.0.8	12/12/96	Cobalt	16.9		0.13	mg/kg dw
MDSED2.0.8	12/12/96	Copper	1360		0.1	mg/kg dw
MDSED2.0.8	12/12/96	Cyanide	2.7		1.3	mg/kg dw
MDSED2.0.8	12/12/96	Iron	37300		0.21	mg/kg dw
MDSED2.0.8	12/12/96	Lead	356	*	0.22	mg/kg dw
MDSED2.0.8	12/12/96	Magnesium	17700		0.91	mg/kg dw
MDSED2.0.8	12/12/96	Manganese	1280		0.018	mg/kg dw
MDSED2.0.8	12/12/96	Mercury	0.16		0.013	mg/kg dw
MDSED2.0.8	12/12/96	Nickel	2710		0.11	mg/kg dw
MDSED2.0.8	12/12/96	Potassium	5110		6.4	mg/kg dw
MDSED2.0.8	12/12/96	Selenium	2.3		0.43	mg/kg dw
MDSED2.0.8	12/12/96	Silver	0.82	B	0.08	mg/kg dw
MDSED2.0.8	12/12/96	Sodium	925	B	24	mg/kg dw
MDSED2.0.8	12/12/96	Thallium	8.3	BN	0.5	mg/kg dw
MDSED2.0.8	12/12/96	Tin	139		0.31	mg/kg dw
MDSED2.0.8	12/12/96	Vanadium	39.9	N	0.084	mg/kg dw
MDSED2.0.8	12/12/96	Zinc	8960		0.16	mg/kg dw
MDSED2.0.8	12/12/96	2-Methylnaphthalene	110	DJ	2200	ug/kg dw
MDSED2.0.8	12/12/96	2-Methylnaphthalene	82	J	460	ug/kg dw
MDSED2.0.8	12/12/96	Acenaphthene	560	DJ	2200	ug/kg dw
MDSED2.0.8	12/12/96	Acenaphthene	370	J	460	ug/kg dw
MDSED2.0.8	12/12/96	Acenaphthylene	44	DJ	2200	ug/kg dw
MDSED2.0.8	12/12/96	Acenaphthylene	34	J	460	ug/kg dw
MDSED2.0.8	12/12/96	Anthracene	960	DJ	2200	ug/kg dw
MDSED2.0.8	12/12/96	Anthracene	580		460	ug/kg dw
MDSED2.0.8	12/12/96	Aroclor-1254	300		220	ug/kg dw
MDSED2.0.8	12/12/96	Benzo(a)anthracene	3800	D	2200	ug/kg dw
MDSED2.0.8	12/12/96	Benzo(a)anthracene	2800		460	ug/kg dw
MDSED2.0.8	12/12/96	Benzo(a)pyrene	3400	D	2200	ug/kg dw
MDSED2.0.8	12/12/96	Benzo(a)pyrene	2000		460	ug/kg dw
MDSED2.0.8	12/12/96	Benzo(b)fluoranthene	5300	D	2200	ug/kg dw
MDSED2.0.8	12/12/96	Benzo(b)fluoranthene	3600		460	ug/kg dw
MDSED2.0.8	12/12/96	Benzo(g,h,i)perylene	1900	DJ	2200	ug/kg dw
MDSED2.0.8	12/12/96	Benzo(g,h,i)perylene	1300		460	ug/kg dw
MDSED2.0.8	12/12/96	Benzo(k)fluoranthene	1700	DJ	2200	ug/kg dw
MDSED2.0.8	12/12/96	Benzo(k)fluoranthene	880		460	ug/kg dw
MDSED2.0.8	12/12/96	bis(2-Ethylhexyl)phthalate	18	J	460	ug/kg dw
MDSED2.0.8	12/12/96	Butylbenzylphthalate	20	J	460	ug/kg dw
MDSED2.0.8	12/12/96	Carbazole	900	DJ	2200	ug/kg dw
MDSED2.0.8	12/12/96	Carbazole	610		460	ug/kg dw
MDSED2.0.8	12/12/96	Chrysene	4900	D	2200	ug/kg dw
MDSED2.0.8	12/12/96	Chrysene	2600		460	ug/kg dw
MDSED2.0.8	12/12/96	Di-n-butylphthalate	10	J	460	ug/kg dw
MDSED2.0.8	12/12/96	Di-n-octylphthalate	21	J	460	ug/kg dw
MDSED2.0.8	12/12/96	Dibenzo(a,h)anthracene	450	DJ	2200	ug/kg dw
MDSED2.0.8	12/12/96	Dibenzo(a,h)anthracene	400	J	460	ug/kg dw
MDSED2.0.8	12/12/96	Dibenzofuran	290	DJ	2200	ug/kg dw
MDSED2.0.8	12/12/96	Dibenzofuran	220	J	460	ug/kg dw
MDSED2.0.8	12/12/96	Endrin ketone	13	JP	22	ug/kg dw
MDSED2.0.8	12/12/96	Fluoranthene	10000	D	2200	ug/kg dw
MDSED2.0.8	12/12/96	Fluoranthene	5800	E	460	ug/kg dw
MDSED2.0.8	12/12/96	Fluorene	630	DJ	2200	ug/kg dw
MDSED2.0.8	12/12/96	Fluorene	450	J	460	ug/kg dw
MDSED2.0.8	12/12/96	gamma-Chlordane	14	P	12	ug/kg dw
MDSED2.0.8	12/12/96	Heptachlor epoxide	7.1	JP	12	ug/kg dw
MDSED2.0.8	12/12/96	Indeno(1,2,3-cd)pyrene	1700	DJ	2200	ug/kg dw
MDSED2.0.8	12/12/96	Indeno(1,2,3-cd)pyrene	1500		460	ug/kg dw
MDSED2.0.8	12/12/96	Naphthalene	140	DJ	2200	ug/kg dw
MDSED2.0.8	12/12/96	Naphthalene	96	J	460	ug/kg dw
MDSED2.0.8	12/12/96	Phenanthrene	6800	D	2200	ug/kg dw
MDSED2.0.8	12/12/96	Phenanthrene	4100	E	460	ug/kg dw
MDSED2.0.8	12/12/96	Pyrene	7300	D	2200	ug/kg dw
MDSED2.0.8	12/12/96	Pyrene	5800	E	460	ug/kg dw
MDSED2.0.8	12/12/96	Toluene	4	BJ	14	ug/kg dw

Appendix B-1. Analytes Present in Shallow Soil/Sediment Samples Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSED3.0.5	12/13/96	Aluminum	16700		0.84	mg/kg dw
MDSED3.0.5	12/13/96	Antimony	0.78	UN	0.78	mg/kg dw
MDSED3.0.5	12/13/96	Arsenic	71.5		0.46	mg/kg dw
MDSED3.0.5	12/13/96	Barium	150	N*	0.014	mg/kg dw
MDSED3.0.5	12/13/96	Beryllium	1.3		0.034	mg/kg dw
MDSED3.0.5	12/13/96	Cadmium	6.7		0.048	mg/kg dw
MDSED3.0.5	12/13/96	Calcium	58300		0.48	mg/kg dw
MDSED3.0.5	12/13/96	Chromium	49.7		0.074	mg/kg dw
MDSED3.0.5	12/13/96	Cobalt	16.5		0.11	mg/kg dw
MDSED3.0.5	12/13/96	Copper	76.2		0.096	mg/kg dw
MDSED3.0.5	12/13/96	Iron	52000		0.2	mg/kg dw
MDSED3.0.5	12/13/96	Lead	127	*	0.2	mg/kg dw
MDSED3.0.5	12/13/96	Magnesium	15700		0.8	mg/kg dw
MDSED3.0.5	12/13/96	Manganese	3110		0.016	mg/kg dw
MDSED3.0.5	12/13/96	Mercury	0.04	B	0.012	mg/kg dw
MDSED3.0.5	12/13/96	Nickel	52		0.098	mg/kg dw
MDSED3.0.5	12/13/96	Potassium	5940		5.6	mg/kg dw
MDSED3.0.5	12/13/96	Selenium	4		0.38	mg/kg dw
MDSED3.0.5	12/13/96	Silver	0.35	B	0.07	mg/kg dw
MDSED3.0.5	12/13/96	Sodium	407	B	22	mg/kg dw
MDSED3.0.5	12/13/96	Thallium	3.9	N	0.44	mg/kg dw
MDSED3.0.5	12/13/96	Tin	4.9	B	0.36	mg/kg dw
MDSED3.0.5	12/13/96	Vanadium	54.8	N	0.074	mg/kg dw
MDSED3.0.5	12/13/96	Zinc	1700		0.13	mg/kg dw
MDSED3.0.5	12/13/96	alpha-Chlordane	1.6	J	2	ug/kg dw
MDSED3.0.5	12/13/96	Anthracene	8.7	J	400	ug/kg dw
MDSED3.0.5	12/13/96	Aroclor-1254	21	J	40	ug/kg dw
MDSED3.0.5	12/13/96	Benzo(a)anthracene	50	J	400	ug/kg dw
MDSED3.0.5	12/13/96	Benzo(a)pyrene	69	J	400	ug/kg dw
MDSED3.0.5	12/13/96	Benzo(b)fluoranthene	110	J	400	ug/kg dw
MDSED3.0.5	12/13/96	Benzo(g,h,i)perylene	63	J	400	ug/kg dw
MDSED3.0.5	12/13/96	Benzo(k)fluoranthene	24	J	400	ug/kg dw
MDSED3.0.5	12/13/96	bis(2-Ethylhexyl)phthalate	9.9	J	400	ug/kg dw
MDSED3.0.5	12/13/96	Butylbenzylphthalate	12	J	400	ug/kg dw
MDSED3.0.5	12/13/96	Chrysene	60	J	400	ug/kg dw
MDSED3.0.5	12/13/96	Di-n-butylphthalate	7.5	J	400	ug/kg dw
MDSED3.0.5	12/13/96	Di-n-octylphthalate	10	J	400	ug/kg dw
MDSED3.0.5	12/13/96	Fluoranthene	81	J	400	ug/kg dw
MDSED3.0.5	12/13/96	gamma-Chlordane	2.7		2	ug/kg dw
MDSED3.0.5	12/13/96	Indeno(1,2,3-cd)pyrene	63	J	400	ug/kg dw
MDSED3.0.5	12/13/96	Phenanthrene	38	J	400	ug/kg dw
MDSED3.0.5	12/13/96	Pyrene	77	J	400	ug/kg dw

Appendix B-1. Analytes Present in Shallow Soil/Sediment Samples Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSED4.0.5	12/13/96	Aluminum	37300		2	mg/kg dw
MDSED4.0.5	12/13/96	Antimony	1.9	UN	1.9	mg/kg dw
MDSED4.0.5	12/13/96	Arsenic	7.7		1	mg/kg dw
MDSED4.0.5	12/13/96	Barium	106	N*	0.034	mg/kg dw
MDSED4.0.5	12/13/96	Beryllium	2.1		0.08	mg/kg dw
MDSED4.0.5	12/13/96	Cadmium	2.9		0.11	mg/kg dw
MDSED4.0.5	12/13/96	Calcium	12200		1.1	mg/kg dw
MDSED4.0.5	12/13/96	Chromium	45.6		0.18	mg/kg dw
MDSED4.0.5	12/13/96	Cobalt	7.3		0.26	mg/kg dw
MDSED4.0.5	12/13/96	Copper	16.1		0.22	mg/kg dw
MDSED4.0.5	12/13/96	Iron	38500		0.44	mg/kg dw
MDSED4.0.5	12/13/96	Lead	21.9	*	0.48	mg/kg dw
MDSED4.0.5	12/13/96	Magnesium	9210		1.8	mg/kg dw
MDSED4.0.5	12/13/96	Manganese	431		0.038	mg/kg dw
MDSED4.0.5	12/13/96	Nickel	38.2		0.22	mg/kg dw
MDSED4.0.5	12/13/96	Potassium	10700		13	mg/kg dw
MDSED4.0.5	12/13/96	Silver	0.25	B	0.16	mg/kg dw
MDSED4.0.5	12/13/96	Sodium	357	B	50	mg/kg dw
MDSED4.0.5	12/13/96	Sulfate as SO4	148		140	mg/kg dw
MDSED4.0.5	12/13/96	Thallium	1.9	BN	1	mg/kg dw
MDSED4.0.5	12/13/96	Tin	2.5	B	0.82	mg/kg dw
MDSED4.0.5	12/13/96	Vanadium	77	N	0.18	mg/kg dw
MDSED4.0.5	12/13/96	Zinc	270		0.32	mg/kg dw
MDSED4.0.5	12/13/96	Aroclor-1254	25	J	47	ug/kg dw
MDSED4.0.5	12/13/96	Chloroform	1	J	14	ug/kg dw
MDSED4.0.5	12/13/96	Di-n-butylphthalate	21	J	470	ug/kg dw
MDSED4.0.5	12/13/96	Fluoranthene	20	J	470	ug/kg dw
MDSED4.0.5	12/13/96	Phenanthrene	16	J	470	ug/kg dw
MDSED4.0.5	12/13/96	Pyrene	23	J	470	ug/kg dw

Appendix B-1. Analytes Present in Shallow Soil/Sediment Samples
Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSED5.0.5	12/13/96	Aluminum	13900		0.96	mg/kg dw
MDSED5.0.5	12/13/96	Antimony	0.88	UN	0.88	mg/kg dw
MDSED5.0.5	12/13/96	Arsenic	23.8		0.52	mg/kg dw
MDSED5.0.5	12/13/96	Barium	210	N*	0.016	mg/kg dw
MDSED5.0.5	12/13/96	Beryllium	1.1		0.038	mg/kg dw
MDSED5.0.5	12/13/96	Cadmium	4.1		0.056	mg/kg dw
MDSED5.0.5	12/13/96	Calcium	90000		0.54	mg/kg dw
MDSED5.0.5	12/13/96	Chromium	30.3		0.084	mg/kg dw
MDSED5.0.5	12/13/96	Cobalt	10.3		0.13	mg/kg dw
MDSED5.0.5	12/13/96	Copper	38		0.1	mg/kg dw
MDSED5.0.5	12/13/96	Iron	27800		0.21	mg/kg dw
MDSED5.0.5	12/13/96	Lead	57	*	0.22	mg/kg dw
MDSED5.0.5	12/13/96	Magnesium	44400		0.91	mg/kg dw
MDSED5.0.5	12/13/96	Manganese	2210		0.018	mg/kg dw
MDSED5.0.5	12/13/96	Mercury	0.1		0.013	mg/kg dw
MDSED5.0.5	12/13/96	Nickel	30.6		0.11	mg/kg dw
MDSED5.0.5	12/13/96	Potassium	5900		6.4	mg/kg dw
MDSED5.0.5	12/13/96	Selenium	1.5		0.43	mg/kg dw
MDSED5.0.5	12/13/96	Silver	0.46	B	0.08	mg/kg dw
MDSED5.0.5	12/13/96	Sodium	353	B	24	mg/kg dw
MDSED5.0.5	12/13/96	Sulfate as SO4	524		140	mg/kg dw
MDSED5.0.5	12/13/96	Thallium	1.6	BN	0.5	mg/kg dw
MDSED5.0.5	12/13/96	Tin	3.3	B	0.4	mg/kg dw
MDSED5.0.5	12/13/96	Vanadium	42	N	0.084	mg/kg dw
MDSED5.0.5	12/13/96	Zinc	324		0.16	mg/kg dw
MDSED5.0.5	12/13/96	Aroclor-1254	15	JP	46	ug/kg dw
MDSED5.0.5	12/13/96	Benzo(b)fluoranthene	21	J	460	ug/kg dw
MDSED5.0.5	12/13/96	Benzo(k)fluoranthene	6.9	J	460	ug/kg dw
MDSED5.0.5	12/13/96	Di-n-butylphthalate	7	J	460	ug/kg dw
MDSED5.0.5	12/13/96	Fluoranthene	25	J	460	ug/kg dw
MDSED5.0.5	12/13/96	Heptachlor	1.4	J	2.3	ug/kg dw
MDSED5.0.5	12/13/96	Phenanthrene	14	J	460	ug/kg dw
MDSED5.0.5	12/13/96	Pyrene	24	J	460	ug/kg dw

Appendix B-1. Analytes Present in Shallow Soil/Sediment Samples Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSED6.0.5	12/13/96	Aluminum	19900		0.94	mg/kg dw
MDSED6.0.5	12/13/96	Antimony	0.92	UN	0.92	mg/kg dw
MDSED6.0.5	12/13/96	Arsenic	12.6		0.52	mg/kg dw
MDSED6.0.5	12/13/96	Barium	225	N*	0.016	mg/kg dw
MDSED6.0.5	12/13/96	Beryllium	1.6		0.038	mg/kg dw
MDSED6.0.5	12/13/96	Cadmium	6.9		0.054	mg/kg dw
MDSED6.0.5	12/13/96	Calcium	26800		0.53	mg/kg dw
MDSED6.0.5	12/13/96	Chromium	28.4		0.083	mg/kg dw
MDSED6.0.5	12/13/96	Cobalt	12.4		0.12	mg/kg dw
MDSED6.0.5	12/13/96	Copper	38.1		0.1	mg/kg dw
MDSED6.0.5	12/13/96	Iron	31000		0.21	mg/kg dw
MDSED6.0.5	12/13/96	Lead	434	*	0.22	mg/kg dw
MDSED6.0.5	12/13/96	Magnesium	10300		0.9	mg/kg dw
MDSED6.0.5	12/13/96	Manganese	1240		0.018	mg/kg dw
MDSED6.0.5	12/13/96	Mercury	0.21		0.013	mg/kg dw
MDSED6.0.5	12/13/96	Nickel	29.4		0.1	mg/kg dw
MDSED6.0.5	12/13/96	Potassium	4080		6.3	mg/kg dw
MDSED6.0.5	12/13/96	Selenium	1.7		0.42	mg/kg dw
MDSED6.0.5	12/13/96	Silver	0.6	B	0.078	mg/kg dw
MDSED6.0.5	12/13/96	Sodium	430	B	24	mg/kg dw
MDSED6.0.5	12/13/96	Sulfate as SO4	237		140	mg/kg dw
MDSED6.0.5	12/13/96	Sulfide (9030)	72		34	mg/kg dw
MDSED6.0.5	12/13/96	Thallium	2.3	N	0.5	mg/kg dw
MDSED6.0.5	12/13/96	Tin	5	B	0.4	mg/kg dw
MDSED6.0.5	12/13/96	Vanadium	50.2	N	0.083	mg/kg dw
MDSED6.0.5	12/13/96	Zinc	1500		0.16	mg/kg dw
MDSED6.0.5	12/13/96	2-Methylnaphthalene	26	J	450	ug/kg dw
MDSED6.0.5	12/13/96	4,4'-DDD	2.7	JP	4.6	ug/kg dw
MDSED6.0.5	12/13/96	4,4'-DDE	11		4.6	ug/kg dw
MDSED6.0.5	12/13/96	4,4'-DDT	18		4.6	ug/kg dw
MDSED6.0.5	12/13/96	Acenaphthene	25	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Acenaphthylene	11	J	450	ug/kg dw
MDSED6.0.5	12/13/96	alpha-Chlordane	0.93	J	2.3	ug/kg dw
MDSED6.0.5	12/13/96	Anthracene	62	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Aroclor-1254	55		45	ug/kg dw
MDSED6.0.5	12/13/96	Benzo(a)anthracene	290	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Benzo(a)pyrene	250	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Benzo(b)fluoranthene	380	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Benzo(g,h,i)perylene	180	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Benzo(k)fluoranthene	130	J	450	ug/kg dw
MDSED6.0.5	12/13/96	bis(2-Ethylhexyl)phthalate	28	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Bromomethane	7	J	14	ug/kg dw
MDSED6.0.5	12/13/96	Butylbenzylphthalate	18	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Chrysene	290	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Di-n-butylphthalate	18	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Di-n-octylphthalate	36	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Dibenzo(a,h)anthracene	39	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Dibenzofuran	14	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Fluoranthene	540		450	ug/kg dw
MDSED6.0.5	12/13/96	Fluorene	25	J	450	ug/kg dw
MDSED6.0.5	12/13/96	gamma-Chlordane	1.5	JP	2.3	ug/kg dw
MDSED6.0.5	12/13/96	Heptachlor	1.6	JP	2.3	ug/kg dw
MDSED6.0.5	12/13/96	Indeno(1,2,3-cd)pyrene	180	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Naphthalene	11	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Phenanthrene	350	J	450	ug/kg dw
MDSED6.0.5	12/13/96	Pyrene	600		450	ug/kg dw
MDSED6.0.5	12/13/96	Toluene	2	J	14	ug/kg dw
MDSED6.0.5	12/13/96	Xylenes	3	J	14	ug/kg dw

Appendix B-1. Analytes Present in Shallow Soil/Sediment Samples
Phase III Investigation *(continued)*

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSED7.0.5	12/13/96	Aluminum	9720		0.92	mg/kg dw
MDSED7.0.5	12/13/96	Antimony	0.84	UN	0.84	mg/kg dw
MDSED7.0.5	12/13/96	Arsenic	10.7		0.5	mg/kg dw
MDSED7.0.5	12/13/96	Barium	44.6	N*	0.016	mg/kg dw
MDSED7.0.5	12/13/96	Beryllium	0.65		0.038	mg/kg dw
MDSED7.0.5	12/13/96	Cadmium	2.4		0.053	mg/kg dw
MDSED7.0.5	12/13/96	Calcium	15200		0.51	mg/kg dw
MDSED7.0.5	12/13/96	Chromium	40.1		0.081	mg/kg dw
MDSED7.0.5	12/13/96	Cobalt	7	B	0.12	mg/kg dw
MDSED7.0.5	12/13/96	Copper	21.9		0.1	mg/kg dw
MDSED7.0.5	12/13/96	Iron	19800		0.2	mg/kg dw
MDSED7.0.5	12/13/96	Lead	29.8	*	0.22	mg/kg dw
MDSED7.0.5	12/13/96	Magnesium	7640		0.88	mg/kg dw
MDSED7.0.5	12/13/96	Manganese	629		0.018	mg/kg dw
MDSED7.0.5	12/13/96	Mercury	0.07		0.013	mg/kg dw
MDSED7.0.5	12/13/96	Nickel	21.1		0.1	mg/kg dw
MDSED7.0.5	12/13/96	Potassium	2950		6.1	mg/kg dw
MDSED7.0.5	12/13/96	Silver	0.23	B	0.076	mg/kg dw
MDSED7.0.5	12/13/96	Sodium	188	B	24	mg/kg dw
MDSED7.0.5	12/13/96	Sulfate as SO4	717		130	mg/kg dw
MDSED7.0.5	12/13/96	Thallium	1.5	BN	0.48	mg/kg dw
MDSED7.0.5	12/13/96	Tin	2.5	B	0.38	mg/kg dw
MDSED7.0.5	12/13/96	Vanadium	29.2	N	0.081	mg/kg dw
MDSED7.0.5	12/13/96	Zinc	300		0.14	mg/kg dw
MDSED7.0.5	12/13/96	4,4'-DDD	4.6		4.4	ug/kg dw
MDSED7.0.5	12/13/96	4,4'-DDE	2.7	J	4.4	ug/kg dw
MDSED7.0.5	12/13/96	4,4'-DDT	140	E	4.4	ug/kg dw
MDSED7.0.5	12/13/96	4,4'-DDT	200		44	ug/kg dw
MDSED7.0.5	12/13/96	Aldrin	1.3	J	2.2	ug/kg dw
MDSED7.0.5	12/13/96	Aroclor-1254	89		44	ug/kg dw
MDSED7.0.5	12/13/96	Benzo(a)anthracene	15	J	440	ug/kg dw
MDSED7.0.5	12/13/96	Benzo(b)fluoranthene	20	J	440	ug/kg dw
MDSED7.0.5	12/13/96	bis(2-Ethylhexyl)phthalate	8.2	J	440	ug/kg dw
MDSED7.0.5	12/13/96	Butylbenzylphthalate	14	J	440	ug/kg dw
MDSED7.0.5	12/13/96	Di-n-butylphthalate	18	J	440	ug/kg dw
MDSED7.0.5	12/13/96	Di-n-octylphthalate	8	J	440	ug/kg dw
MDSED7.0.5	12/13/96	Dieldrin	3.2	J	4.4	ug/kg dw
MDSED7.0.5	12/13/96	Fluoranthene	23	J	440	ug/kg dw
MDSED7.0.5	12/13/96	gamma-Chlordane	1.6	JP	2.2	ug/kg dw
MDSED7.0.5	12/13/96	Heptachlor	2.3	P	2.2	ug/kg dw
MDSED7.0.5	12/13/96	Heptachlor epoxide	1.4	JP	2.2	ug/kg dw
MDSED7.0.5	12/13/96	Phenanthrene	14	J	440	ug/kg dw
MDSED7.0.5	12/13/96	Pyrene	23	J	440	ug/kg dw
MDSED7.0.5	12/13/96	Toluene	0.9	J	13	ug/kg dw
MDSED7.0.5	12/13/96	Xylenes	2	J	13	ug/kg dw

Appendix B-1. Analytes Present in Shallow Soil/Sediment Samples
Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSED8.0.5	12/13/96	Aluminum	9970		0.98	mg/kg dw
MDSED8.0.5	12/13/96	Antimony	0.94	UN	0.94	mg/kg dw
MDSED8.0.5	12/13/96	Arsenic	5.4		0.53	mg/kg dw
MDSED8.0.5	12/13/96	Barium	102	N*	0.016	mg/kg dw
MDSED8.0.5	12/13/96	Beryllium	0.61	B	0.04	mg/kg dw
MDSED8.0.5	12/13/96	Cadmium	1.7		0.056	mg/kg dw
MDSED8.0.5	12/13/96	Calcium	26400		0.54	mg/kg dw
MDSED8.0.5	12/13/96	Chromium	15.2		0.086	mg/kg dw
MDSED8.0.5	12/13/96	Cobalt	7	B	0.13	mg/kg dw
MDSED8.0.5	12/13/96	Copper	12.1		0.1	mg/kg dw
MDSED8.0.5	12/13/96	Iron	18200		0.21	mg/kg dw
MDSED8.0.5	12/13/96	Lead	19.4	*	0.23	mg/kg dw
MDSED8.0.5	12/13/96	Magnesium	6530		0.92	mg/kg dw
MDSED8.0.5	12/13/96	Manganese	439		0.018	mg/kg dw
MDSED8.0.5	12/13/96	Mercury	0.05	B	0.014	mg/kg dw
MDSED8.0.5	12/13/96	Nickel	14		0.11	mg/kg dw
MDSED8.0.5	12/13/96	Potassium	2910		6.6	mg/kg dw
MDSED8.0.5	12/13/96	Silver	0.26	B	0.08	mg/kg dw
MDSED8.0.5	12/13/96	Sodium	153	B	25	mg/kg dw
MDSED8.0.5	12/13/96	Sulfate as SO4	257		140	mg/kg dw
MDSED8.0.5	12/13/96	Sulfide (9030)	220		35	mg/kg dw
MDSED8.0.5	12/13/96	Thallium	0.98	BN	0.5	mg/kg dw
MDSED8.0.5	12/13/96	Tin	2.4	B	0.4	mg/kg dw
MDSED8.0.5	12/13/96	Vanadium	27.5	N	0.086	mg/kg dw
MDSED8.0.5	12/13/96	Zinc	83.8		0.16	mg/kg dw
MDSED8.0.5	12/13/96	2-Butanone (MEK)	34		14	ug/kg dw
MDSED8.0.5	12/13/96	Acetone	200		14	ug/kg dw
MDSED8.0.5	12/13/96	Aroclor-1254	33	J	46	ug/kg dw
MDSED8.0.5	12/13/96	Benzene	1	BJ	14	ug/kg dw
MDSED8.0.5	12/13/96	Benzo(a)pyrene	26	J	460	ug/kg dw
MDSED8.0.5	12/13/96	Benzo(b)fluoranthene	30	J	460	ug/kg dw
MDSED8.0.5	12/13/96	Benzo(k)fluoranthene	12	J	460	ug/kg dw
MDSED8.0.5	12/13/96	bis(2-Ethylhexyl)phthalate	13	J	460	ug/kg dw
MDSED8.0.5	12/13/96	Butylbenzylphthalate	17	J	460	ug/kg dw
MDSED8.0.5	12/13/96	Carbon disulfide	1	J	14	ug/kg dw
MDSED8.0.5	12/13/96	Chlorobenzene	1	J	14	ug/kg dw
MDSED8.0.5	12/13/96	Chloroform	1	J	14	ug/kg dw
MDSED8.0.5	12/13/96	Di-n-butylphthalate	14	J	460	ug/kg dw
MDSED8.0.5	12/13/96	Di-n-octylphthalate	13	J	460	ug/kg dw
MDSED8.0.5	12/13/96	Dieldrin	2.6	J	4.6	ug/kg dw
MDSED8.0.5	12/13/96	Fluoranthene	41	J	460	ug/kg dw
MDSED8.0.5	12/13/96	Heptachlor	1.4	JP	2.3	ug/kg dw
MDSED8.0.5	12/13/96	Heptachlor epoxide	1.6	JP	2.3	ug/kg dw
MDSED8.0.5	12/13/96	Phenanthrene	16	J	460	ug/kg dw
MDSED8.0.5	12/13/96	Pyrene	36	J	460	ug/kg dw
MDSED8.0.5	12/13/96	Tetrachloroethene	2	J	14	ug/kg dw
MDSED8.0.5	12/13/96	Toluene	1	J	14	ug/kg dw
MDSED8.0.5	12/13/96	Xylenes	4	J	14	ug/kg dw

Appendix B-1. Analytes Present in Shallow Soil/Sediment Samples
Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSED9.0.5	12/13/96	Aluminum	14600		0.92	mg/kg dw
MDSED9.0.5	12/13/96	Antimony	0.84	UN	0.84	mg/kg dw
MDSED9.0.5	12/13/96	Arsenic	29.2		0.5	mg/kg dw
MDSED9.0.5	12/13/96	Barium	184	N*	0.016	mg/kg dw
MDSED9.0.5	12/13/96	Beryllium	1.2		0.038	mg/kg dw
MDSED9.0.5	12/13/96	Cadmium	3.7		0.053	mg/kg dw
MDSED9.0.5	12/13/96	Calcium	57200		0.51	mg/kg dw
MDSED9.0.5	12/13/96	Chromium	28.3		0.081	mg/kg dw
MDSED9.0.5	12/13/96	Cobalt	11.7		0.12	mg/kg dw
MDSED9.0.5	12/13/96	Copper	28.4		0.1	mg/kg dw
MDSED9.0.5	12/13/96	Iron	30700		0.2	mg/kg dw
MDSED9.0.5	12/13/96	Lead	45.5	*	0.22	mg/kg dw
MDSED9.0.5	12/13/96	Magnesium	17300		0.88	mg/kg dw
MDSED9.0.5	12/13/96	Manganese	2740		0.018	mg/kg dw
MDSED9.0.5	12/13/96	Mercury	0.03	B	0.013	mg/kg dw
MDSED9.0.5	12/13/96	Nickel	32		0.1	mg/kg dw
MDSED9.0.5	12/13/96	Potassium	5050		6.1	mg/kg dw
MDSED9.0.5	12/13/96	Selenium	2.4		0.41	mg/kg dw
MDSED9.0.5	12/13/96	Silver	0.45	B	0.076	mg/kg dw
MDSED9.0.5	12/13/96	Sodium	345	B	24	mg/kg dw
MDSED9.0.5	12/13/96	Sulfate as SO4	511		130	mg/kg dw
MDSED9.0.5	12/13/96	Thallium	2.2	N	0.48	mg/kg dw
MDSED9.0.5	12/13/96	Tin	4.2	B	0.38	mg/kg dw
MDSED9.0.5	12/13/96	Vanadium	42.6	N	0.081	mg/kg dw
MDSED9.0.5	12/13/96	Zinc	329		0.14	mg/kg dw
MDSED9.0.5	12/13/96	Aroclor-1254	13	JP	44	ug/kg dw
MDSED9.0.5	12/13/96	Benzo(b)fluoranthene	22	J	440	ug/kg dw
MDSED9.0.5	12/13/96	Benzo(k)fluoranthene	6.6	J	440	ug/kg dw
MDSED9.0.5	12/13/96	bis(2-Ethylhexyl)phthalate	33	J	440	ug/kg dw
MDSED9.0.5	12/13/96	Butylbenzylphthalate	15	J	440	ug/kg dw
MDSED9.0.5	12/13/96	Chloroform	1	J	13	ug/kg dw
MDSED9.0.5	12/13/96	Di-n-butylphthalate	34	J	440	ug/kg dw
MDSED9.0.5	12/13/96	Di-n-octylphthalate	34	J	440	ug/kg dw
MDSED9.0.5	12/13/96	Ethylbenzene	3	J	13	ug/kg dw
MDSED9.0.5	12/13/96	Fluoranthene	26	J	440	ug/kg dw
MDSED9.0.5	12/13/96	Heptachlor	1.3	JP	2.2	ug/kg dw
MDSED9.0.5	12/13/96	Phenanthrene	20	J	440	ug/kg dw
MDSED9.0.5	12/13/96	Pyrene	24	J	440	ug/kg dw
MDSED9.0.5	12/13/96	Toluene	2	J	13	ug/kg dw
MDSED9.0.5	12/13/96	Xylenes	8	J	13	ug/kg dw

Appendix B-1. Analytes Present in Shallow Soil/Sediment Samples -- TCLP Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSED1.2.5	12/12/96	Manganese	477	E	15	ug/l
MDSED1.2.5	12/12/96	Selenium	4.4	B	5	ug/l
MDSED1.2.5	12/12/96	Lead	2.5	B	3	ug/l
MDSED1.2.5	12/12/96	Zinc	1310	E	20	ug/l
MDSED1.2.5	12/12/96	Sodium	1390000		1000	ug/l
MDSED1.2.5	12/12/96	Potassium	23900	E	5000	ug/l
MDSED1.2.5	12/12/96	Nickel	97.8		40	ug/l
MDSED1.2.5	12/12/96	Soil pH measured in water	8.3			units
MDSED1.2.5	12/12/96	Copper	20.9	B	25	ug/l
MDSED1.2.5	12/12/96	Calcium	558000		5000	ug/l
MDSED1.2.5	12/12/96	Cadmium	65.3		5	ug/l
MDSED1.2.5	12/12/96	Barium	1400		200	ug/l
MDSED1.2.5	12/12/96	Aluminum	57.3	B	200	ug/l
MDSED1.2.5	12/12/96	Magnesium	31500	E	5000	ug/l
MDSED1.2.5	12/12/96	Iron	51.9	B*	100	ug/l
MDSED7.0.5	12/13/96	Nickel	31.4	B	40	ug/l
MDSED7.0.5	12/13/96	Potassium	62700	E	5000	ug/l
MDSED7.0.5	12/13/96	Sodium	1450000		1000	ug/l
MDSED7.0.5	12/13/96	Zinc	1000	E	20	ug/l
MDSED7.0.5	12/13/96	Lead	2.5	B	3	ug/l
MDSED7.0.5	12/13/96	Soil pH measured in water	7.8			units
MDSED7.0.5	12/13/96	Manganese	1290	E	15	ug/l
MDSED7.0.5	12/13/96	Selenium	4.4	B	5	ug/l
MDSED7.0.5	12/13/96	Iron	19.9	B*	100	ug/l
MDSED7.0.5	12/13/96	Copper	5.7	B	25	ug/l
MDSED7.0.5	12/13/96	Chromium	2.7	B	10	ug/l
MDSED7.0.5	12/13/96	Calcium	335000		5000	ug/l
MDSED7.0.5	12/13/96	Cadmium	11.3		5	ug/l
MDSED7.0.5	12/13/96	Aluminum	17.7	B	200	ug/l
MDSED7.0.5	12/13/96	Barium	282		200	ug/l
MDSED7.0.5	12/13/96	Magnesium	73000	E	5000	ug/l

APPENDIX B-2

SUBSURFACE SOIL SAMPLING

Appendix B-2. Analytes Present in Soil
Phase III Investigation

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSB1.0.5	12/10/96	Aluminum	7750		4.6	mg/kg dw
MDSB1.0.5	12/10/96	Antimony	22.5	BN	3.3	mg/kg dw
MDSB1.0.5	12/10/96	Arsenic	1250		2.6	mg/kg dw
MDSB1.0.5	12/10/96	Barium	1080	N*	0.081	mg/kg dw
MDSB1.0.5	12/10/96	Beryllium	2.8	B	0.18	mg/kg dw
MDSB1.0.5	12/10/96	Cadmium	7.3		0.28	mg/kg dw
MDSB1.0.5	12/10/96	Calcium	90500		2.6	mg/kg dw
MDSB1.0.5	12/10/96	Chromium	278		0.41	mg/kg dw
MDSB1.0.5	12/10/96	Cobalt	130		0.63	mg/kg dw
MDSB1.0.5	12/10/96	Copper	574		0.52	mg/kg dw
MDSB1.0.5	12/10/96	Iron	226000		1	mg/kg dw
MDSB1.0.5	12/10/96	Lead	150	*	1.1	mg/kg dw
MDSB1.0.5	12/10/96	Magnesium	744	B	4.4	mg/kg dw
MDSB1.0.5	12/10/96	Manganese	102000		0.088	mg/kg dw
MDSB1.0.5	12/10/96	Mercury	0.27		0.013	mg/kg dw
MDSB1.0.5	12/10/96	Nickel	428		0.54	mg/kg dw
MDSB1.0.5	12/10/96	Potassium	1590	B	31	mg/kg dw
MDSB1.0.5	12/10/96	Selenium	79		2.1	mg/kg dw
MDSB1.0.5	12/10/96	Silver	6.2	B	0.38	mg/kg dw
MDSB1.0.5	12/10/96	Sodium	267	B	120	mg/kg dw
MDSB1.0.5	12/10/96	Sulfate as SO4	34200		140	mg/kg dw
MDSB1.0.5	12/10/96	Thallium	10.1	N	2.4	mg/kg dw
MDSB1.0.5	12/10/96	Tin	38.2	B	1.6	mg/kg dw
MDSB1.0.5	12/10/96	Vanadium	429	N	0.41	mg/kg dw
MDSB1.0.5	12/10/96	Zinc	164		0.76	mg/kg dw
MDSB1.0.5	12/10/96	bis(2-Ethylhexyl)phthalate	24	J	440	ug/kg dw
MDSB1.0.5	12/10/96	Carbon disulfide	2	J	14	ug/kg dw
MDSB1.0.5	12/10/96	Di-n-butylphthalate	11	J	440	ug/kg dw
MDSB1.0.5	12/10/96	Di-n-octylphthalate	23	J	440	ug/kg dw
MDSB1.0.5	12/10/96	Ethylbenzene	3	J	14	ug/kg dw
MDSB1.0.5	12/10/96	Methylene chloride (Dichloromethane)	3	J	14	ug/kg dw
MDSB1.0.5	12/10/96	Phenanthrene	9.3	J	440	ug/kg dw
MDSB1.0.5	12/10/96	Toluene	7	BJ	14	ug/kg dw
MDSB1.0.5	12/10/96	Xylenes	10	J	14	ug/kg dw
MDSB1.0.5	12/10/96	Xylenes	4	J	14	ug/kg dw
MDSB1.35	12/10/96	Aluminum	28700		0.86	mg/kg dw
MDSB1.35	12/10/96	Antimony	0.81	UN	0.81	mg/kg dw
MDSB1.35	12/10/96	Arsenic	17.8		0.48	mg/kg dw
MDSB1.35	12/10/96	Barium	74.7	N*	0.014	mg/kg dw
MDSB1.35	12/10/96	Beryllium	1.3		0.034	mg/kg dw
MDSB1.35	12/10/96	Cadmium	2.4		0.05	mg/kg dw
MDSB1.35	12/10/96	Calcium	79900		0.48	mg/kg dw
MDSB1.35	12/10/96	Chromium	45		0.076	mg/kg dw
MDSB1.35	12/10/96	Cobalt	18.6		0.11	mg/kg dw
MDSB1.35	12/10/96	Copper	32.2		0.096	mg/kg dw
MDSB1.35	12/10/96	Iron	26300		0.2	mg/kg dw
MDSB1.35	12/10/96	Lead	24.3	*	0.2	mg/kg dw
MDSB1.35	12/10/96	Magnesium	7520		0.81	mg/kg dw
MDSB1.35	12/10/96	Manganese	1310		0.016	mg/kg dw
MDSB1.35	12/10/96	Nickel	39.6		0.098	mg/kg dw
MDSB1.35	12/10/96	Potassium	4910		5.8	mg/kg dw
MDSB1.35	12/10/96	Selenium	1.4		0.38	mg/kg dw
MDSB1.35	12/10/96	Silver	0.21	B	0.07	mg/kg dw
MDSB1.35	12/10/96	Sodium	220	B	22	mg/kg dw
MDSB1.35	12/10/96	Sulfate as SO4	675		120	mg/kg dw
MDSB1.35	12/10/96	Thallium	1.5	BN	0.44	mg/kg dw
MDSB1.35	12/10/96	Tin	2.6	B	0.28	mg/kg dw
MDSB1.35	12/10/96	Vanadium	43.5	N	0.076	mg/kg dw
MDSB1.35	12/10/96	Zinc	342		0.13	mg/kg dw
MDSB1.35	12/10/96	Chloroform	0.6	J	12	ug/kg dw
MDSB1.35	12/10/96	Di-n-butylphthalate	6.3	J	400	ug/kg dw
MDSB1.35	12/10/96	Toluene	1	J	12	ug/kg dw
MDSB1.35	12/10/96	Toluene	3	BJ	12	ug/kg dw
MDSB1.35	12/10/96	Xylenes	3	J	12	ug/kg dw
MDSB1.35	12/10/96	Xylenes	2	J	12	ug/kg dw

Appendix B-2. Analytes Present in Soil
Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSB2.0.5	12/11/96	Aluminum	10300		1.3	mg/kg dw
MDSB2.0.5	12/11/96	Antimony	6.2	UN	6.2	mg/kg dw
MDSB2.0.5	12/11/96	Arsenic	997		0.71	mg/kg dw
MDSB2.0.5	12/11/96	Barium	369	N*	0.02	mg/kg dw
MDSB2.0.5	12/11/96	Beryllium	2.6	B	0.05	mg/kg dw
MDSB2.0.5	12/11/96	Cadmium	5.4	B	0.08	mg/kg dw
MDSB2.0.5	12/11/96	Calcium	146000		0.73	mg/kg dw
MDSB2.0.5	12/11/96	Chromium	119		0.11	mg/kg dw
MDSB2.0.5	12/11/96	Cobalt	85.5		0.18	mg/kg dw
MDSB2.0.5	12/11/96	Copper	305		0.14	mg/kg dw
MDSB2.0.5	12/11/96	Cyanide	13		1.8	mg/kg dw
MDSB2.0.5	12/11/96	Iron	116000		0.3	mg/kg dw
MDSB2.0.5	12/11/96	Lead	134	*	0.31	mg/kg dw
MDSB2.0.5	12/11/96	Magnesium	713	B	1.2	mg/kg dw
MDSB2.0.5	12/11/96	Manganese	64600		0.02	mg/kg dw
MDSB2.0.5	12/11/96	Mercury	0.46		0.02	mg/kg dw
MDSB2.0.5	12/11/96	Nickel	273		0.16	mg/kg dw
MDSB2.0.5	12/11/96	Potassium	756	B	8.8	mg/kg dw
MDSB2.0.5	12/11/96	Selenium	46.8		0.58	mg/kg dw
MDSB2.0.5	12/11/96	Silver	2.6	B	0.1	mg/kg dw
MDSB2.0.5	12/11/96	Sulfate as SO4	55700		180	mg/kg dw
MDSB2.0.5	12/11/96	Thallium	4.6	UN	4.6	mg/kg dw
MDSB2.0.5	12/11/96	Tin	10.7	B	0.43	mg/kg dw
MDSB2.0.5	12/11/96	Vanadium	322	N	0.11	mg/kg dw
MDSB2.0.5	12/11/96	Zinc	121		0.21	mg/kg dw
MDSB2.0.5	12/11/96	Acetone	11	J	18	ug/kg dw
MDSB2.0.5	12/11/96	bis(2-Ethylhexyl)phthalate	42	J	620	ug/kg dw
MDSB2.0.5	12/11/96	Chloroform	1	J	18	ug/kg dw
MDSB2.0.5	12/11/96	Di-n-octylphthalate	37	J	620	ug/kg dw
MDSB2.0.5	12/11/96	Methylene chloride (Dichloromethane)	5	J	18	ug/kg dw
MDSB2.0.5	12/11/96	Toluene	3	BJ	18	ug/kg dw
MDSB2.0.5	12/11/96	Xylenes	3	J	18	ug/kg dw
MDSB2.0.5	12/11/96	Xylenes	3	J	18	ug/kg dw

Appendix B-2. Analytes Present in Soil
Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSB3.0.5	12/11/96	Aluminum	9380		1.8	mg/kg dw
MDSB3.0.5	12/11/96	Antimony	18.5	BN	1.2	mg/kg dw
MDSB3.0.5	12/11/96	Arsenic	799		0.96	mg/kg dw
MDSB3.0.5	12/11/96	Barium	1130	N*	0.03	mg/kg dw
MDSB3.0.5	12/11/96	Beryllium	1.8		0.07	mg/kg dw
MDSB3.0.5	12/11/96	Cadmium	2.8		0.1	mg/kg dw
MDSB3.0.5	12/11/96	Calcium	184000		0.98	mg/kg dw
MDSB3.0.5	12/11/96	Chromium	65.8		0.16	mg/kg dw
MDSB3.0.5	12/11/96	Cobalt	61.5		0.23	mg/kg dw
MDSB3.0.5	12/11/96	Copper	211		0.2	mg/kg dw
MDSB3.0.5	12/11/96	Cyanide	2.1		2.5	mg/kg dw
MDSB3.0.5	12/11/96	Iron	92800		0.4	mg/kg dw
MDSB3.0.5	12/11/96	Lead	120	*	0.41	mg/kg dw
MDSB3.0.5	12/11/96	Magnesium	2010		1.6	mg/kg dw
MDSB3.0.5	12/11/96	Manganese	126000		0.032	mg/kg dw
MDSB3.0.5	12/11/96	Mercury	0.49		0.026	mg/kg dw
MDSB3.0.5	12/11/96	Nickel	177		0.2	mg/kg dw
MDSB3.0.5	12/11/96	Potassium	1780		12	mg/kg dw
MDSB3.0.5	12/11/96	Selenium	89.2		0.78	mg/kg dw
MDSB3.0.5	12/11/96	Silver	5.4		0.14	mg/kg dw
MDSB3.0.5	12/11/96	Sodium	327	B	44	mg/kg dw
MDSB3.0.5	12/11/96	Sulfate as SO4	74200		250	mg/kg dw
MDSB3.0.5	12/11/96	Thallium	11.6	UN	11.6	mg/kg dw
MDSB3.0.5	12/11/96	Tin	10.2	B	0.58	mg/kg dw
MDSB3.0.5	12/11/96	Vanadium	315	N	0.16	mg/kg dw
MDSB3.0.5	12/11/96	Zinc	59.9		0.28	mg/kg dw
MDSB3.0.5	12/11/96	Chloroform	1	J	25	ug/kg dw
MDSB3.0.5	12/11/96	Di-n-butylphthalate	12	J	820	ug/kg dw
MDSB3.0.5	12/11/96	Methylene chloride (Dichloromethane)	20	J	25	ug/kg dw
MDSB3.37	12/11/96	Aluminum	6600		0.78	mg/kg dw
MDSB3.37	12/11/96	Antimony	0.72	UN	0.72	mg/kg dw
MDSB3.37	12/11/96	Arsenic	40.1		0.43	mg/kg dw
MDSB3.37	12/11/96	Barium	271	N*	0.013	mg/kg dw
MDSB3.37	12/11/96	Beryllium	1		0.031	mg/kg dw
MDSB3.37	12/11/96	Cadmium	4.3		0.046	mg/kg dw
MDSB3.37	12/11/96	Calcium	42300		0.44	mg/kg dw
MDSB3.37	12/11/96	Chromium	22.2		0.07	mg/kg dw
MDSB3.37	12/11/96	Cobalt	12.6		0.1	mg/kg dw
MDSB3.37	12/11/96	Copper	28		0.088	mg/kg dw
MDSB3.37	12/11/96	Iron	42500		0.18	mg/kg dw
MDSB3.37	12/11/96	Lead	32.8	*	0.18	mg/kg dw
MDSB3.37	12/11/96	Magnesium	8610		0.74	mg/kg dw
MDSB3.37	12/11/96	Manganese	3160		0.014	mg/kg dw
MDSB3.37	12/11/96	Mercury	0.04	B	0.011	mg/kg dw
MDSB3.37	12/11/96	Nickel	41.5		0.09	mg/kg dw
MDSB3.37	12/11/96	Potassium	3170		5.2	mg/kg dw
MDSB3.37	12/11/96	Selenium	4.7		0.36	mg/kg dw
MDSB3.37	12/11/96	Silver	0.18	B	0.064	mg/kg dw
MDSB3.37	12/11/96	Sodium	218	B	20	mg/kg dw
MDSB3.37	12/11/96	Sulfate as SO4	1460		110	mg/kg dw
MDSB3.37	12/11/96	Sulfide (9030)	90		28	mg/kg dw
MDSB3.37	12/11/96	Thallium	3.8	N	0.41	mg/kg dw
MDSB3.37	12/11/96	Tin	3.7	B	0.26	mg/kg dw
MDSB3.37	12/11/96	Vanadium	54.1	N	0.07	mg/kg dw
MDSB3.37	12/11/96	Zinc	856		0.12	mg/kg dw
MDSB3.37	12/11/96	1,1,1-Trichloroethane	1	J	11	ug/kg dw
MDSB3.37	12/11/96	2-Butanone (MEK)	11	J	11	ug/kg dw
MDSB3.37	12/11/96	2-Butanone (MEK)	10	J	11	ug/kg dw
MDSB3.37	12/11/96	Acetone	42		11	ug/kg dw
MDSB3.37	12/11/96	Acetone	33		11	ug/kg dw
MDSB3.37	12/11/96	Benzene	2	J	11	ug/kg dw
MDSB3.37	12/11/96	Benzene	4	J	11	ug/kg dw
MDSB3.37	12/11/96	Benzo(a)anthracene	12	J	380	ug/kg dw
MDSB3.37	12/11/96	Carbon disulfide	2	J	11	ug/kg dw
MDSB3.37	12/11/96	Carbon disulfide	2	J	11	ug/kg dw
MDSB3.37	12/11/96	Di-n-butylphthalate	7.5	J	380	ug/kg dw
MDSB3.37	12/11/96	Fluoranthene	140	J	380	ug/kg dw
MDSB3.37	12/11/96	Heptachlor	1.2	JP	2	ug/kg dw
MDSB3.37	12/11/96	Naphthalene	7	J	380	ug/kg dw
MDSB3.37	12/11/96	Phenanthrene	8	J	380	ug/kg dw
MDSB3.37	12/11/96	Toluene	8	BJ	11	ug/kg dw
MDSB3.37	12/11/96	Toluene	7	J	11	ug/kg dw
MDSB3.37	12/11/96	Xylenes	7	J	11	ug/kg dw
MDSB3.37	12/11/96	Xylenes	3	J	11	ug/kg dw

Appendix B-2. Analytes Present in Soil
Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSB4.0.5	12/13/96	Aluminum	15300		2.8	mg/kg dw
MDSB4.0.5	12/13/96	Antimony	14.6	BN	2	mg/kg dw
MDSB4.0.5	12/13/96	Arsenic	558		1.6	mg/kg dw
MDSB4.0.5	12/13/96	Barium	6650	N*	0.05	mg/kg dw
MDSB4.0.5	12/13/96	Beryllium	4		0.11	mg/kg dw
MDSB4.0.5	12/13/96	Cadmium	3.9		0.16	mg/kg dw
MDSB4.0.5	12/13/96	Calcium	70200		1.6	mg/kg dw
MDSB4.0.5	12/13/96	Chromium	251		0.26	mg/kg dw
MDSB4.0.5	12/13/96	Cobalt	131		0.4	mg/kg dw
MDSB4.0.5	12/13/96	Copper	295		0.32	mg/kg dw
MDSB4.0.5	12/13/96	Iron	98500		0.66	mg/kg dw
MDSB4.0.5	12/13/96	Lead	290	*	0.68	mg/kg dw
MDSB4.0.5	12/13/96	Magnesium	2190	B	2.8	mg/kg dw
MDSB4.0.5	12/13/96	Manganese	59100		0.054	mg/kg dw
MDSB4.0.5	12/13/96	Mercury	0.34		0.02	mg/kg dw
MDSB4.0.5	12/13/96	Nickel	469		0.33	mg/kg dw
MDSB4.0.5	12/13/96	Potassium	860	B	19	mg/kg dw
MDSB4.0.5	12/13/96	Selenium	39.5		1.2	mg/kg dw
MDSB4.0.5	12/13/96	Silver	2.3		0.23	mg/kg dw
MDSB4.0.5	12/13/96	Sodium	266		74	mg/kg dw
MDSB4.0.5	12/13/96	Sulfate as SO4	60600		200	mg/kg dw
MDSB4.0.5	12/13/96	Thallium	2	UN	2	mg/kg dw
MDSB4.0.5	12/13/96	Tin	9.2	B	1.2	mg/kg dw
MDSB4.0.5	12/13/96	Vanadium	312	N	0.26	mg/kg dw
MDSB4.0.5	12/13/96	Zinc	197		0.46	mg/kg dw
MDSB4.0.5	12/13/96	Acetone	14	J	20	ug/kg dw
MDSB4.0.5	12/13/96	Benzo(b)fluoranthene	27	J	680	ug/kg dw
MDSB4.0.5	12/13/96	Benzo(k)fluoranthene	8	J	680	ug/kg dw
MDSB4.0.5	12/13/96	bis(2-Ethylhexyl)phthalate	28	J	680	ug/kg dw
MDSB4.0.5	12/13/96	Butylbenzylphthalate	19	J	680	ug/kg dw
MDSB4.0.5	12/13/96	Chloroform	1	J	20	ug/kg dw
MDSB4.0.5	12/13/96	Di-n-butylphthalate	18	J	680	ug/kg dw
MDSB4.0.5	12/13/96	Di-n-octylphthalate	28	J	680	ug/kg dw
MDSB4.0.5	12/13/96	Fluoranthene	29	J	680	ug/kg dw
MDSB4.0.5	12/13/96	Phenanthrene	15	J	680	ug/kg dw
MDSB4.0.5	12/13/96	Pyrene	28	J	680	ug/kg dw
MDSB4.25	12/13/96	Aluminum	24100		1.1	mg/kg dw
MDSB4.25	12/13/96	Antimony	7.1	BN	0.82	mg/kg dw
MDSB4.25	12/13/96	Arsenic	146		0.64	mg/kg dw
MDSB4.25	12/13/96	Barium	1370	N*	0.02	mg/kg dw
MDSB4.25	12/13/96	Beryllium	2		0.048	mg/kg dw
MDSB4.25	12/13/96	Cadmium	7.7		0.068	mg/kg dw
MDSB4.25	12/13/96	Calcium	53400		0.66	mg/kg dw
MDSB4.25	12/13/96	Chromium	349		0.1	mg/kg dw
MDSB4.25	12/13/96	Cobalt	40.6		0.16	mg/kg dw
MDSB4.25	12/13/96	Copper	417		0.13	mg/kg dw
MDSB4.25	12/13/96	Iron	52300		0.26	mg/kg dw
MDSB4.25	12/13/96	Lead	97.6	*	0.28	mg/kg dw
MDSB4.25	12/13/96	Magnesium	12100		1.1	mg/kg dw
MDSB4.25	12/13/96	Manganese	22300		0.022	mg/kg dw
MDSB4.25	12/13/96	Mercury	0.18		0.016	mg/kg dw
MDSB4.25	12/13/96	Nickel	429		0.13	mg/kg dw
MDSB4.25	12/13/96	Potassium	11200		7.8	mg/kg dw
MDSB4.25	12/13/96	Selenium	17.1		0.52	mg/kg dw
MDSB4.25	12/13/96	Silver	1	B	0.096	mg/kg dw
MDSB4.25	12/13/96	Sodium	466		30	mg/kg dw
MDSB4.25	12/13/96	Sulfate as SO4	50000		160	mg/kg dw
MDSB4.25	12/13/96	Thallium	1.1	BN	0.61	mg/kg dw
MDSB4.25	12/13/96	Tin	11.2		0.48	mg/kg dw
MDSB4.25	12/13/96	Vanadium	89.1	N	0.1	mg/kg dw
MDSB4.25	12/13/96	Zinc	1720		0.18	mg/kg dw
MDSB4.25	12/13/96	2-Butanone (MEK)	9	J	16	ug/kg dw
MDSB4.25	12/13/96	Acetone	220		16	ug/kg dw
MDSB4.25	12/13/96	Benzene	2	BJ	16	ug/kg dw
MDSB4.25	12/13/96	bis(2-Ethylhexyl)phthalate	12	J	560	ug/kg dw
MDSB4.25	12/13/96	Carbon disulfide	17		16	ug/kg dw
MDSB4.25	12/13/96	Chloroform	1	J	16	ug/kg dw
MDSB4.25	12/13/96	Di-n-butylphthalate	6.9	J	560	ug/kg dw
MDSB4.25	12/13/96	Di-n-octylphthalate	11	J	560	ug/kg dw
MDSB4.25	12/13/96	Fluoranthene	16	J	560	ug/kg dw
MDSB4.25	12/13/96	Phenanthrene	13	J	560	ug/kg dw
MDSB4.25	12/13/96	Pyrene	13	J	560	ug/kg dw
MDSB4.25	12/13/96	Toluene	2	J	16	ug/kg dw

Appendix B-2. Analytes Present in Soil
Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSB5.05	12/15/96	Aluminum	4840		0.81	mg/kg dw
MDSB5.05	12/15/96	Antimony	0.79	UN	0.79	mg/kg dw
MDSB5.05	12/15/96	Arsenic	3		4.4	mg/kg dw
MDSB5.05	12/15/96	Barium	31.8	BN*	0.14	mg/kg dw
MDSB5.05	12/15/96	Beryllium	0.78	B	0.032	mg/kg dw
MDSB5.05	12/15/96	Cadmium	0.68	B	0.48	mg/kg dw
MDSB5.05	12/15/96	Calcium	320000		0.46	mg/kg dw
MDSB5.05	12/15/96	Chromium	11.9		0.71	mg/kg dw
MDSB5.05	12/15/96	Cobalt	3.5	B	0.11	mg/kg dw
MDSB5.05	12/15/96	Copper	6.1		0.091	mg/kg dw
MDSB5.05	12/15/96	Iron	8810		0.18	mg/kg dw
MDSB5.05	12/15/96	Lead	11.3	*	2	mg/kg dw
MDSB5.05	12/15/96	Magnesium	16300		0.78	mg/kg dw
MDSB5.05	12/15/96	Manganese	243		0.016	mg/kg dw
MDSB5.05	12/15/96	Nickel	9.6		0.094	mg/kg dw
MDSB5.05	12/15/96	Potassium	3010		5.4	mg/kg dw
MDSB5.05	12/15/96	Selenium	1.5		0.36	mg/kg dw
MDSB5.05	12/15/96	Sodium	141	B	20	mg/kg dw
MDSB5.05	12/15/96	Thallium	0.79	BN	4.2	mg/kg dw
MDSB5.05	12/15/96	Tin	1.6	B	0.33	mg/kg dw
MDSB5.05	12/15/96	Vanadium	12.6	N	0.071	mg/kg dw
MDSB5.05	12/15/96	Zinc	18.9		0.13	mg/kg dw
MDSB5.05	12/15/96	1,2,4-Trichlorobenzene	1100		12	ug/kg dw
MDSB5.05	12/15/96	2-Hexanone	14000		1400	ug/kg dw
MDSB5.05	12/15/96	2-Hexanone	12000	D	2900	ug/kg dw
MDSB5.05	12/15/96	2-Methylnaphthalene	1500		12	ug/kg dw
MDSB5.05	12/15/96	4-Chloro-3-methylphenol	1500		12	ug/kg dw
MDSB5.05	12/15/96	Acenaphthene	21	J	12	ug/kg dw
MDSB5.05	12/15/96	Acetone	2800	DJ	2900	ug/kg dw
MDSB5.05	12/15/96	Anthracene	10	J	12	ug/kg dw
MDSB5.05	12/15/96	beta-BHC	6.3	JP	0.3	ug/kg dw
MDSB5.05	12/15/96	bis(2-Ethylhexyl)phthalate	68	J	380	ug/kg dw
MDSB5.05	12/15/96	Bromomethane	440	BJ	1400	ug/kg dw
MDSB5.05	12/15/96	Bromomethane	1100	BDJ	2900	ug/kg dw
MDSB5.05	12/15/96	Butylbenzylphthalate	16	J	12	ug/kg dw
MDSB5.05	12/15/96	Carbon tetrachloride	110	J	1400	ug/kg dw
MDSB5.05	12/15/96	Chlorobenzene	55	J	1400	ug/kg dw
MDSB5.05	12/15/96	Di-n-butylphthalate	36	J	380	ug/kg dw
MDSB5.05	12/15/96	Di-n-octylphthalate	62	J	380	ug/kg dw
MDSB5.05	12/15/96	Ethylbenzene	20000	B	1400	ug/kg dw
MDSB5.05	12/15/96	Ethylbenzene	19000	BD	2900	ug/kg dw
MDSB5.05	12/15/96	Fluoranthene	10	J	12	ug/kg dw
MDSB5.05	12/15/96	Fluorene	19	J	12	ug/kg dw
MDSB5.05	12/15/96	Phenanthrene	61	J	12	ug/kg dw
MDSB5.05	12/15/96	Pyrene	16	J	12	ug/kg dw
MDSB5.05	12/15/96	Toluene	13000	B	1400	ug/kg dw
MDSB5.05	12/15/96	Toluene	12000	BD	2900	ug/kg dw
MDSB5.05	12/15/96	Xylenes	110000	E	1400	ug/kg dw
MDSB5.05	12/15/96	Xylenes	110000	D	2900	ug/kg dw
MDSB5.11	12/15/96	Aluminum	7330		0.76	mg/kg dw
MDSB5.11	12/15/96	Antimony	0.72	UN	0.72	mg/kg dw
MDSB5.11	12/15/96	Arsenic	10.2		4.2	mg/kg dw
MDSB5.11	12/15/96	Barium	58.6	N*	0.13	mg/kg dw
MDSB5.11	12/15/96	Beryllium	0.72	B	0.031	mg/kg dw
MDSB5.11	12/15/96	Cadmium	1.4		0.44	mg/kg dw
MDSB5.11	12/15/96	Calcium	85500		0.43	mg/kg dw
MDSB5.11	12/15/96	Chromium	14.4		0.68	mg/kg dw
MDSB5.11	12/15/96	Cobalt	11.2		0.1	mg/kg dw
MDSB5.11	12/15/96	Copper	13.7		0.086	mg/kg dw
MDSB5.11	12/15/96	Iron	17700		0.18	mg/kg dw
MDSB5.11	12/15/96	Lead	23.1	*	1.8	mg/kg dw
MDSB5.11	12/15/96	Magnesium	45100		0.73	mg/kg dw
MDSB5.11	12/15/96	Manganese	993		0.014	mg/kg dw
MDSB5.11	12/15/96	Nickel	26.4		0.088	mg/kg dw
MDSB5.11	12/15/96	Potassium	3780		5.1	mg/kg dw
MDSB5.11	12/15/96	Selenium	1.2		0.34	mg/kg dw
MDSB5.11	12/15/96	Silver	0.2	B	0.063	mg/kg dw
MDSB5.11	12/15/96	Sodium	162	B	20	mg/kg dw
MDSB5.11	12/15/96	Thallium	1.8	N	4	mg/kg dw
MDSB5.11	12/15/96	Tin	2.4	B	0.32	mg/kg dw
MDSB5.11	12/15/96	Vanadium	20.3	N	0.068	mg/kg dw
MDSB5.11	12/15/96	Zinc	37.9		0.12	mg/kg dw
MDSB5.11	12/15/96	1,2-Dichloroethane	31		11	ug/kg dw
MDSB5.11	12/15/96	2-Butanone (MEK)	3	J	11	ug/kg dw
MDSB5.11	12/15/96	Acetone	12		11	ug/kg dw
MDSB5.11	12/15/96	Benzo(a)anthracene	11	J	11	ug/kg dw
MDSB5.11	12/15/96	bis(2-Ethylhexyl)phthalate	9.7	J	360	ug/kg dw
MDSB5.11	12/15/96	Butylbenzylphthalate	13	J	11	ug/kg dw
MDSB5.11	12/15/96	Di-n-butylphthalate	31	J	360	ug/kg dw
MDSB5.11	12/15/96	Di-n-octylphthalate	9.3	J	360	ug/kg dw
MDSB5.11	12/15/96	Ethylbenzene	4	J	11	ug/kg dw
MDSB5.11	12/15/96	Phenanthrene	10	J	11	ug/kg dw
MDSB5.11	12/15/96	Pyrene	6.8	J	11	ug/kg dw
MDSB5.11	12/15/96	Toluene	17	B	11	ug/kg dw
MDSB5.11	12/15/96	Xylenes	8	J	11	ug/kg dw

Appendix B-2. Analytes Present in Soil
Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSB6.2.5	12/13/96	Aluminum	17300		1.8	mg/kg dw
MDSB6.2.5	12/13/96	Antimony	9.3	BN	1.3	mg/kg dw
MDSB6.2.5	12/13/96	Arsenic	836		1	mg/kg dw
MDSB6.2.5	12/13/96	Barium	891	N*	0.03	mg/kg dw
MDSB6.2.5	12/13/96	Beryllium	4.2		0.08	mg/kg dw
MDSB6.2.5	12/13/96	Cadmium	5.8		0.1	mg/kg dw
MDSB6.2.5	12/13/96	Calcium	126000		1	mg/kg dw
MDSB6.2.5	12/13/96	Chromium	185		0.16	mg/kg dw
MDSB6.2.5	12/13/96	Cobalt	146		0.26	mg/kg dw
MDSB6.2.5	12/13/96	Copper	257		0.21	mg/kg dw
MDSB6.2.5	12/13/96	Cyanide	3.3		2.8	mg/kg dw
MDSB6.2.5	12/13/96	Iron	127000		0.42	mg/kg dw
MDSB6.2.5	12/13/96	Lead	205	*	0.44	mg/kg dw
MDSB6.2.5	12/13/96	Magnesium	3230		1.8	mg/kg dw
MDSB6.2.5	12/13/96	Manganese	128000		0.04	mg/kg dw
MDSB6.2.5	12/13/96	Mercury	0.44		0.03	mg/kg dw
MDSB6.2.5	12/13/96	Nickel	453		0.21	mg/kg dw
MDSB6.2.5	12/13/96	Potassium	2580		12	mg/kg dw
MDSB6.2.5	12/13/96	Selenium	84.9		0.84	mg/kg dw
MDSB6.2.5	12/13/96	Silver	4.5		0.16	mg/kg dw
MDSB6.2.5	12/13/96	Sodium	237	B	48	mg/kg dw
MDSB6.2.5	12/13/96	Sulfate as SO4	79100		270	mg/kg dw
MDSB6.2.5	12/13/96	Thallium	6.5	UN	6.5	mg/kg dw
MDSB6.2.5	12/13/96	Tin	10.5	B	0.78	mg/kg dw
MDSB6.2.5	12/13/96	Vanadium	404	N	0.16	mg/kg dw
MDSB6.2.5	12/13/96	Zinc	237		0.3	mg/kg dw
MDSB6.2.5	12/13/96	Acetone	23	J	27	ug/kg dw
MDSB6.2.5	12/13/96	bis(2-Ethylhexyl)phthalate	58	J	890	ug/kg dw
MDSB6.2.5	12/13/96	Butylbenzylphthalate	32	J	890	ug/kg dw
MDSB6.2.5	12/13/96	Di-n-butylphthalate	52	J	890	ug/kg dw
MDSB6.2.5	12/13/96	Di-n-octylphthalate	55	J	890	ug/kg dw
MDSB6.2.5	12/13/96	Fluoranthene	34	J	890	ug/kg dw
MDSB6.2.5	12/13/96	Phenanthrene	50	J	890	ug/kg dw
MDSB6.2.5	12/13/96	Pyrene	23	J	890	ug/kg dw

Appendix B-2. Analytes Present in Soil – TCLP
Phase III Investigation (continued)

Sample ID	Date Sampled	Analyte	Result	Qualifier	MDL	Units
MDSB1.0.5	12/10/96	Barium	201		200	ug/l
MDSB1.0.5	12/10/96	Soil pH measured in water	7.3			units
MDSB1.0.5	12/10/96	Selenium	36		5	ug/l
MDSB1.0.5	12/10/96	Lead	1.9	B	3	ug/l
MDSB1.0.5	12/10/96	Zinc	152	E	20	ug/l
MDSB1.0.5	12/10/96	Antimony	8.4	B	60	ug/l
MDSB1.0.5	12/10/96	Copper	16.9	B	25	ug/l
MDSB1.0.5	12/10/96	Cadmium	2.4	B	5	ug/l
MDSB1.0.5	12/10/96	Magnesium	13700	E	5000	ug/l
MDSB1.0.5	12/10/96	Aluminum	74.6	B	200	ug/l
MDSB1.0.5	12/10/96	Iron	76	U*	100	ug/l
MDSB1.0.5	12/10/96	Calcium	1140000		5000	ug/l
MDSB1.0.5	12/10/96	Manganese	42300	E	15	ug/l
MDSB1.0.5	12/10/96	Nickel	62.9		40	ug/l
MDSB1.0.5	12/10/96	Potassium	33100	E	5000	ug/l
MDSB1.0.5	12/10/96	Silver	6.2	B	10	ug/l
MDSB1.0.5	12/10/96	Sodium	1690000		1000	ug/l
MDSB1.0.5	12/10/96	Cobalt	2.1	B	50	ug/l
MDSB1.35	12/10/96	Manganese	6620	E	15	ug/l
MDSB1.35	12/10/96	Magnesium	26700	E	5000	ug/l
MDSB1.35	12/10/96	Lead	2.1	B	3	ug/l
MDSB1.35	12/10/96	Zinc	194	E	20	ug/l
MDSB1.35	12/10/96	Sodium	1720000		1000	ug/l
MDSB1.35	12/10/96	Silver	3.3	B	10	ug/l
MDSB1.35	12/10/96	Potassium	45600	E	5000	ug/l
MDSB1.35	12/10/96	Selenium	17.3		5	ug/l
MDSB1.35	12/10/96	Iron	1.6	B*	100	ug/l
MDSB1.35	12/10/96	Soil pH measured in water	8			units
MDSB1.35	12/10/96	Copper	4.4	B	25	ug/l
MDSB1.35	12/10/96	Cobalt	4.1	B	50	ug/l
MDSB1.35	12/10/96	Calcium	685000		5000	ug/l
MDSB1.35	12/10/96	Cadmium	6.7		5	ug/l
MDSB1.35	12/10/96	Barium	532		200	ug/l
MDSB1.35	12/10/96	Aluminum	62.6	B	200	ug/l
MDSB1.35	12/10/96	Nickel	28.2	B	40	ug/l
MDSB4.0.5	12/13/96	Selenium	96.2		5	ug/l
MDSB4.0.5	12/13/96	Potassium	31500	E	5000	ug/l
MDSB4.0.5	12/13/96	Silver	14.2		10	ug/l
MDSB4.0.5	12/13/96	Sodium	1610000		1000	ug/l
MDSB4.0.5	12/13/96	Vanadium	16.4	B	50	ug/l
MDSB4.0.5	12/13/96	Zinc	94	E	20	ug/l
MDSB4.0.5	12/13/96	Lead	16.2		3	ug/l
MDSB4.0.5	12/13/96	Cobalt	48.1	B	50	ug/l
MDSB4.0.5	12/13/96	Arsenic	41.7		10	ug/l
MDSB4.0.5	12/13/96	Aluminum	141	B	200	ug/l
MDSB4.0.5	12/13/96	Nickel	174		40	ug/l
MDSB4.0.5	12/13/96	Soil pH measured in water	7.4			units
MDSB4.0.5	12/13/96	Manganese	142000	E	15	ug/l
MDSB4.0.5	12/13/96	Barium	159	B	200	ug/l
MDSB4.0.5	12/13/96	Beryllium	1.6	B	5	ug/l
MDSB4.0.5	12/13/96	Cadmium	1.8	B	5	ug/l
MDSB4.0.5	12/13/96	Calcium	1120000		5000	ug/l
MDSB4.0.5	12/13/96	Iron	76	U*	100	ug/l
MDSB4.0.5	12/13/96	Magnesium	16600	E	5000	ug/l
MDSB4.25	12/13/96	Magnesium	9460	E	5000	ug/l
MDSB4.25	12/13/96	Soil pH measured in water	7.8			units
MDSB4.25	12/13/96	Aluminum	130	B	200	ug/l
MDSB4.25	12/13/96	Antimony	6.9	B	60	ug/l
MDSB4.25	12/13/96	Barium	376		200	ug/l
MDSB4.25	12/13/96	Cadmium	41.2		5	ug/l
MDSB4.25	12/13/96	Mercury (TCLP)	11.8	B	20	ug/l
MDSB4.25	12/13/96	Arsenic	11		10	ug/l
MDSB4.25	12/13/96	Calcium	680000		5000	ug/l
MDSB4.25	12/13/96	Lead	15.1		3	ug/l
MDSB4.25	12/13/96	Zinc	1280	E	20	ug/l
MDSB4.25	12/13/96	Vanadium	1.7	B	50	ug/l
MDSB4.25	12/13/96	Sodium	1630000		1000	ug/l
MDSB4.25	12/13/96	Silver	11.1		10	ug/l
MDSB4.25	12/13/96	Potassium	193000	E	5000	ug/l
MDSB4.25	12/13/96	Nickel	446		40	ug/l
MDSB4.25	12/13/96	Manganese	122000	E	15	ug/l
MDSB4.25	12/13/96	Copper	63.2		25	ug/l
MDSB4.25	12/13/96	Iron	76	U*	100	ug/l
MDSB4.25	12/13/96	Cobalt	79.3		50	ug/l
MDSB4.25	12/13/96	Selenium	77.6		5	ug/l

APPENDIX B-3

GROUND-WATER SAMPLES

Appendix B-3. Analytes Present in Ground Water
Phase III Investigation

Sample ID	Date Sampled	Analyte	Concentration Detected	MDL	Units	Date Analyzed
MDMP1GW1	12/16/96	Arsenic	19.9	3.8	ug/l	01/06/97
MDMP1GW1	12/16/96	Calcium	268000	3.8	ug/l	01/06/97
MDMP1GW1	12/16/96	Cyanide	0.01	0.01	mg/l	12/27/96
MDMP1GW1	12/16/96	Iron	158	1.6	ug/l	01/06/97
MDMP1GW1	12/16/96	Magnesium	11900	6.6	ug/l	01/06/97
MDMP1GW1	12/16/96	Manganese	1220	0.013	ug/l	01/06/97
MDMP1GW1	12/16/96	Phenol	37	10	ug/l	01/03/97
MDMP1GW1	12/16/96	Potassium	1220000	46	ug/l	01/06/97
MDMP1GW1	12/16/96	Sodium	89300	180	ug/l	01/06/97
MDMP1GW1	12/16/96	Sulfate as SO4	2500	250	mg/l	12/18/96

APPENDIX B-4

ELECTRONIC DATA